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WHOLE No. 3197

NEW YORK, SATURDAY, JUNE 14, 1919

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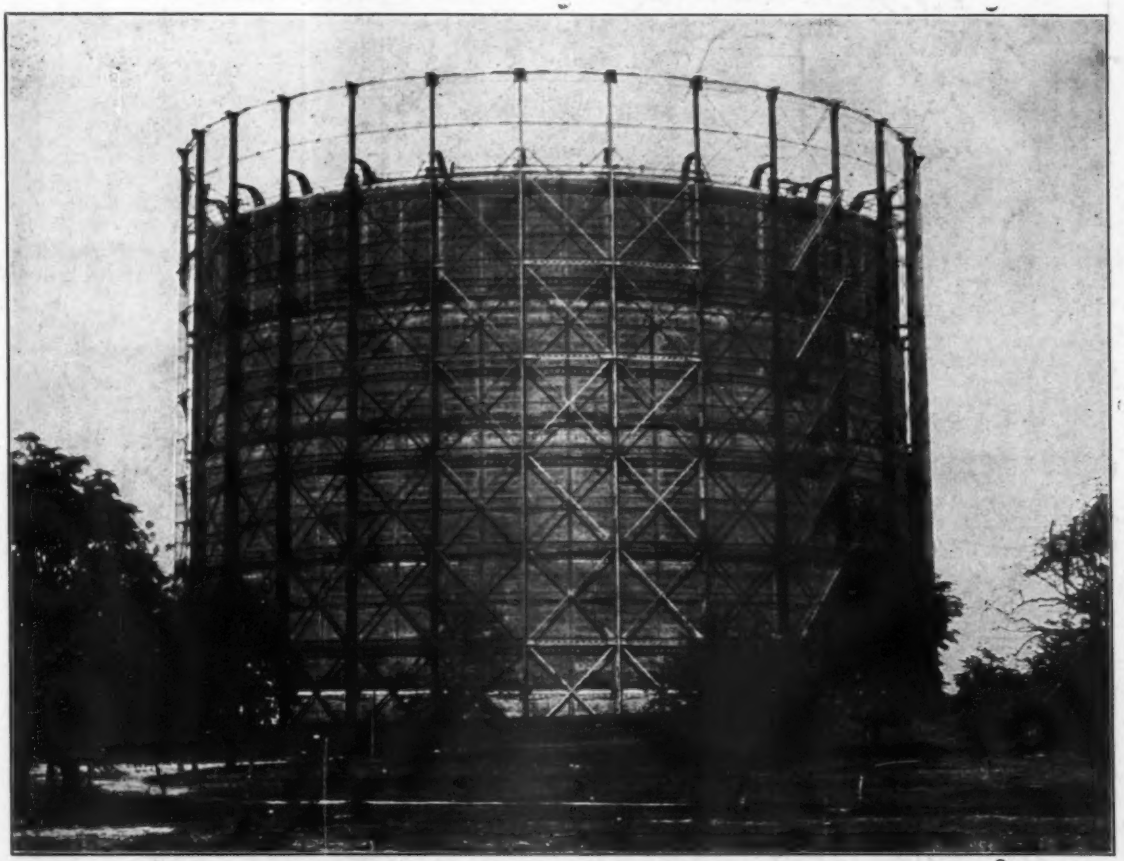

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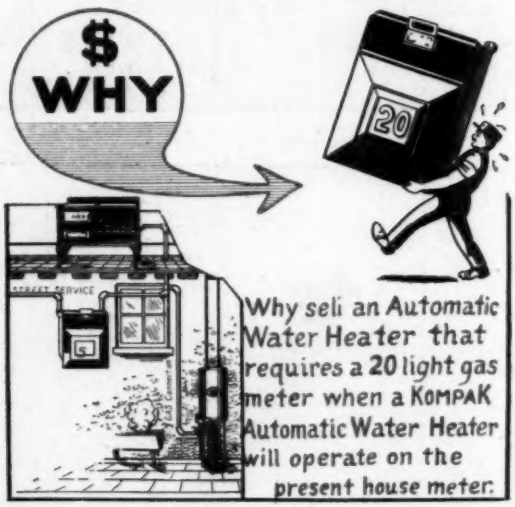
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Industrial Gas as Related to Photo-Engraving

Drying Photolithographic Plates in Oven of Special Construction — Use of Gas Air Heater and Blower Possibly a Great Boon to Cut Makers

By GILBERT C. SHADWELL

A goodly proportion of the gas fraternity are familiar with the use of their fuel in connection with the manufacture of electrotypes. Owing to the growth of that industry, there is about one electrotyping plant in or near every place of importance. Gas men know the process involved and are familiar with the means of melting the metal which goes to back up the copper "electro" which has been obtained from the original "line cut" or "half-tone."

It seems curious, however, that relatively few know that there is a field of endeavor awaiting them also in what may be called the parent industry where these same line cuts and half-tones are made.

Perhaps it is because the fuel load is not so heavy, or it may be because it is not "new." Neither excuse, however, is a sufficient reason for neglecting the industry, because if such places of business are not served with the best of equipment they will purchase makeshift gas appliances which almost always cause trouble, either directly or indirectly, to the gas company.

Basis of Processes

Broadly speaking, all the modern processes are the outcome of a discovery that a preparation of a colloidal substance (such as albumen) and potassium bichromate could be hardened and rendered insoluble and non-absorbent in water by exposure to light, and that a photographic negative permitted the passage through it of light in varying degrees of intensity, so a film of the preparation placed under a negative was liable to be hardened and rendered insoluble in degrees varying with the intensity of the light affecting it. This discovery governs the production of "cuts" of practically every kind.

Considering "line cuts" first of all, the first necessity in securing a good result is the suitability of the original to be reproduced. This should be of one tone or degree of color all through. All black is best, although, as draftsmen know, a red or an orange serve as well, as these photograph "black" quite nicely.

The original drawing then is photographed in the usual way to the size of the required cut. The negative taken is naturally absolutely dense except where the lines of the drawing have affected it, and these are absolutely clear, admitting the unrestricted passage of light through them.

A piece of planished zinc is then prepared (i. e., made sensitive to light) by pouring on to its surface the requisite quantity of the potassium bichromate preparation already mentioned. This is usually done by resting the plate on a platform which is made to rotate about a central axis at a fairly high speed. This enables the colloidal substance to be spread uniformly over the surface of the zinc and any surplus is driven off at the edges. This revolving platform is usually mounted in a gas-fired oven of special design, and when acquired the heat is adjusted so that the sensitizing material will dry nicely on the zinc plate.

In the case of photolithographic and similar plates, they are often of pretty large dimensions and the drying of the sensitizing film is carried out in an oven of

Fig. 1—Oven for drying sensitizing film

special construction such as is shown in Fig. 1. Further reference to this phase of the subject will be made later.

The glass negative and the metal plate are then placed together in a somewhat similar manner to the printing of an ordinary photograph. (The negative is laid upon the sensitized metal and placed to the light.) The light passes through the transparent lines of the negative and hardens the bichromated film beneath them. Both negative and plate are then taken into a dark room, where the metal plate is rolled with an inked roller, placed in a bath of cold water, and allowed to soak until the film becomes so softened at every point that it all washes away except the hardened lines. These lines are then dusted with asphalt and the plate is heated by means of a similar oven or suitable burners so that the asphalt becomes melted on to them. This makes a ground which will resist the action of acid. A coat of varnish is then put over the back and edges of the plate to protect those parts from acid also, and only the spaces between the lines on the surface are left free to its action. The plate is then placed in a bath of dilute nitric acid, which eats away the metal wherever it is exposed; but it leaves the lines of the drawing, which are protected by the hardened and reinforced film standing up above the eaten or etched surface; and these lines, which correspond to those of a wood engraving, are the printing surface of the plate. The plate is then washed and dried, the drying often being accelerated by the use of an oven (see Fig. 2). In large plants the writer believes that the use of a gas-fired air heater and blower would be a great boon to cut makers, and although he has no record of any such installation the suggestion is probably worth while following up. That far greater speed in drying will be obtained need not be doubted for a moment, if the proper size of gas-fired air heater and blower be installed and if it be utilized correctly.

The plate being dry, it is "tooled" to take out any imperfections in etching, etc., and is mounted by being nailed to a wood or metal block which is made the same height as the type with which it can be used in the printing press.

So much for what we usually call "line cuts." But before dealing with what we usually term their opposites—namely, "half-tones"—let us follow some of the so-called intermediate processes.

Intermediate Processes

Various devices have been resorted to in order that effects of tone may be obtained by means of the simple line process. These include grained papers with a surface of chalk upon which are printed close ruled lines crossing at right angles or rows of dots. These give the papers a heavy flat tone upon which a drawing can be made in pencil, chalk or ink, and gradations of tone can be introduced by means of scrapers which remove all or part of the lines or dots so as to leave high lights of pure white.

Hence a drawing on such paper consists of lines or dots or a combination with the drawing itself. Such results give a nice toned appearance but are still line cuts so far as the process itself is concerned. Another method is the well-known Ben Day process. This consists of the use of transparent films of gelatin which have upon them lines, dots or other designs in varying combination in relief so that they

Fig. 2—Metal plate drier

can be inked up by a roller. When placed over a drawing their transparency enables the operator to see exactly what passage he is dealing with, and by means of a burnisher he can impress these lines, dots, etc., on any passage of the drawing. They then become a part of the drawing and are reproduced in the usual way.

Other arrangements include grained paper, which is touched only on the ridges and which reproduces in sections so as to give a "line" result. There are several others somewhat similar; but enough has been said on this score to give the gas man general ideas as to the principles involved so that he can talk intelligently when soliciting business in that part of the industry.

There is, however, a process which is of special interest called the swelled gelatin process, and this will be briefly described. It is based upon the fact that gelatin sensitized with potassium bichromate swells when placed in water, and, moreover, this swelling is in proportion to the amount of light to which it has been exposed. A negative taken from a drawing which varies in tone, not being thoroughly black all through, varies in the quality of its transparent lines and dots, and when a piece of paper or glass coated with sensitized gelatin is exposed to the action of such a negative it is affected according to the amount of light the negative allows to pass. After making a print on such paper or glass it is placed in a dish of water and the surface is allowed to swell, which it does in varying degrees, the portion unaffected by the light absorbing most water and swelling most, the hardened lines of the drawing not swelling at all. This swelled print is then placed in a frame and a preparation of plaster is poured upon it to make a mold of its surface.

Building Up with Wax

When this has set and the gelatin film has been removed, the mold is filled with a preparation of

wax. This wax is heated in a low temperature oven, and it may here be remarked that steam is often employed as the heat system. The writer believes that even when exhaust steam is the "fuel" employed, gas is preferable, because in the case of those plants which shut their steam supply down and only require the heat for the ovens the cost of operation is excessive and if gas be used it is quite independent of anybody except the gas supply system. Points such as these are liable to be overlooked, however obvious they may be.

The wax having been allowed to set, it is released from the plaster. Additional wax is then built up where necessary in the passes which represent what become the hollows in the resultant cut so that these may be conveniently deep and out of the way of the printing surface. This wax mold is then graphited and a surface of copper deposited electrically in the same way that an electrotype is made (see former article on this subject and footnote below).

The lines and dots of the finished copper cut when backed up with metal and mounted vary slightly in height, the result being that the slightly lower dots do not come so closely in contact with the inking roller or with the paper, and so produce when printed a gray impression corresponding to the grayness of the original drawing.

This process is elegant in its results and some very high-grade work is produced by its means, but it is naturally very expensive. It is much used for the reproduction of line and stipple engravings where fine dots and lines are apt to be printed in delicate tones. If even finer results are needed, the plaster cast is omitted as well as the wax and the sensitized gelatin is coated with plumbago or other similar material of a metallic nature so as to enable it to receive a copper deposit direct and then be backed up like an electrotype. Unfortunately this is even more expensive, but if money is not a prime factor for consideration the results are often well worth the money.

The gas man will also find the process known as typographic etching of interest to him. This is, briefly, a non-photographic process of obtaining line cuts in relief. A brass plate is coated with a film of wax upon which a tracing of the drawing is to be reproduced. By means of an etching needle the lines of the drawing are cut upon the wax down to the surface of the brass. A pencil of wax and a hot metal pencil (heated in a gas burner) are used to produce a flow of melted wax which drips between the lines and builds them up. In maps, etc., where type has to be set into a cut it is a useful arrangement, as the type can be impressed into the wax and the effect is neat and precise. In this way an electrotype can be formed as previously referred to.

We now come to the important half-tone processes which are made use of daily literally by thousands upon thousands for reproducing photographs in print.

Producing the Half-tone

We have now seen that it is only possible to approximate to the printing of a flat of graduated tone by producing a broken or granulated surface which shall present a series of lines or dots that when inked or impressed upon paper shall, by the variations of proximity and size, give the impression of an unbroken tone. This necessitates the lines or dots being so small that the eye shall not at a glance appreciate the broken-up character of the surface of the cut. Many efforts resulted in the production of the "screen," which itself has only been made possible by the invention of ruling machines of a remarkable delicacy. Such screens are made by coating a perfectly flawless piece of glass with a certain composition. When coated it is placed in a ruling machine and lines are ruled varying from 50 to 300 to the inch. The lines are then eaten in a little further by means of hydrofluoric acid, and then an opaque color is gently rubbed into the resultant hair lines. Two such glass screens are then sealed together, with the diagonal lines crossing at right angles, so that we get a number of minute squares of glass through which the light can pass.

To produce a half-tone cut from a picture or photograph, a negative is obtained by photography in the usual way. The screen is quite close to the "plate," but not quite touching it, so that the picture is photographed through the screen. The result is termed a screen negative. The tones are thus represented by the little square dots formed by the squares. The positive is then printed in a manner familiar to the zinc plates in a line cut, except that the sensitizing is done somewhat differently. In the case of half-tones polished copper is usually employed, due to its hardness and texture. The film is made of potassium bichromate with gelatin or a high grade of fish-glue (the manufacture of which was described in a former article). The gelatin is usually melted in a water-jacketed gas-heated pot, the outer of jacketing pot being of galvanized cast iron and the inner pot of enameled iron so that it will remain unaffected by coming into contact with metals and in turn adversely affect the potassium bichromate. This coating is then dried in the same way as zinc line cut plates and exposed under the screen negative to the action of light in the same manner as the zinc plates. Also as before, the action of the light hardens the gelatin film and the portion not hardened becomes soluble in water.

The copper plate thus made, having the gelatin picture in lines and dots, is placed in an oven so that it can be heated in order to burn in the image to the surface of the metal, just like a japanned sur-

Note—In making an electrotype a molding composition consisting mainly of wax with a little black lead is poured when molten into a shallow metal tray, and when it has set its surface is brushed over with black lead and polished. An impression of the form, which is also black-leaded, is next taken in the wax while it is still warm, often by the aid of a hydraulic press, and the mold thus obtained, after being separated from the form, undergoes a process of building up, which consists of dropping heated wax upon those portions which require to be more deeply sunk in the finished type—that is, upon those places where "whites" are to appear in the print. The face of the finished mold is then carefully covered with black lead, which is a conductor of electricity, and the whole is immersed in an electrotyping bath, where copper is deposited on the black-leaded portions by means of the current from a battery or a dynamo machine. When the deposit, or shell, is sufficiently thick, it is disengaged from the wax mold, backed with a metal which resembles type-metal but contains a larger proportion of lead, and trimmed and planed. For use in rotary presses curved electrotypes may be produced.

face might be, except that the greatest care has to be taken to prevent the gelatin from "running," which is liable to occur if the operation is hastened too much. Blurred cuts or those having portions which are distorted and sometimes seen in work which is obviously hurried are often due to this cause. The reason for the baking is to enable the photographic picture to resist subsequent etching.

Photo-engravers Prefer Gas

The writer has been informed by photo-engravers that they prefer gas for this work, especially when ovens have been built especially for them which give a perfectly even heat with only a very slight variation in temperature, but gas men should be careful to see that the matter of proper construction is adhered to, as otherwise they may give themselves considerable trouble. Thermostatic control is desirable but not essential. In some cases the ovens are very crude and inefficient, although fairly effective. One means commonly employed to obtain even heat is to use a layer of sand in the oven. This sand rests on a steel sheet, underneath which pipe burners are installed. The effect, of course, is to give a pretty fairly even heat and a heat which is fairly well maintained without the chance of many sudden changes in temperature. All things considered, it is doubtful, however, if it is the best thing for the work. The writer knows of other styles of ovens which have been made for this purpose which are much more desirable, although more expensive in first cost. They will, however, save considerable money in operation and are to be preferred. A detailed description, however, is omitted, as this is of interest mainly to the manufacturer only.

After Baking

Returning to our copper plate, after it has been "baked" it is etched by being placed in a bath of perchloride of iron until sufficient "depth" has been obtained. Whenever the surface of the plate is free from lines and dots, it is eaten away by the perchloride and the lines and dots are in relief. The first etching is called rough etching, as only a rather flat general impression is produced. But the process is carried further in order to obtain finer results and to bring out the contrasts of black and white necessary to a good reproduction. This is done by stopping out and re-etching similar to that adopted in photogravure. This fine etching is where good work comes in, and it is a pity that more attention is not paid to it. However, labor is now scarce and speed is often aimed at, which causes the quality to suffer. Speed, however, is now gained by the use of an acid blast which gives good results generally. The engraver has to guard against the eating of the acid under the dots. This causes them to wear and break off easily, and quickly reduces the half-tone to the junk pile after printing for only a little while.

The three-color process and similar processes are all evolutions of the above, and although deeply interesting in themselves a description would hardly be in place in this publication. The work involved, however, is a modification of the regular half-tone process, except that more than one cut is made for each finished picture, the light being filtered for each. The gas man will find the manufacture of color filters of interest, but this and similar matters should properly form the subject of a separate article.

In the Intaglio

The Intaglio processes next claim our attention. These are those in which the printing surface is sunk beneath the surrounding portions of the plate and the lower portions (dots, lines, etc.) hold the ink which is to be impressed upon the paper when the plate is wiped clean. The old-style wood cuts were an example of this work, which is now in great demand for what is called photogravure work. There are quite a number of Sunday newspaper supplements now printed in photogravure, and more are likely to spring up throughout the country from time to time, so that a description in outline will be in form.

Photogravure gives the tones of photographs and is a far nearer reproduction than the common half-tone. There are two styles at least. The first uses no screen, but in both cases gelatin bichromatized is employed for the film. As no screen is employed, a means is necessary for to hold the ink. This is done by allowing a cloud of bitumen dust (raised in a box) to settle on the copper plate. This plate is then set horizontally in a special gas-heated oven, and though the heat should be insufficient to entirely melt the dust it is enough to attach fine grains to the plate. Over this prepared surface is laid the film of bichromatized gelatin, upon which is printed the subject through a glass positive. The small hardening process takes place by the light, which is followed by washing out the unhardened portions of gelatin. The plate is then chlorided, which takes care of the etching.

Photogravure is a costly process and was formerly rather uncertain in operation, but due to certain improvements the use has become far wider than formerly. In the Rembrandt Intaglio process the plates are made by the use of a grain screen in place of bitumen powder. In this the ink covers the whole plate—raised as well as sunk portions—but another cylinder having a slightly grooved surface passes over the engraved cylinder and scrapes it; when the reproductions are made on paper the latter has to be dried artificially. The ink employed is of a peculiar oily nature. At least one New York paper employs gas-fired heaters which supply heated air to small ovens through which the paper passes. The flow of air is arranged in a direction contrary to the flow of the heat, and it is found that if about 300 cu. ft. of air per minute be circulated over the printed paper at a temperature of about 250 deg. Fahr. this will take care of the usual speed of one machine, provided the drying ovens are properly made and the air applied to make contact with the paper by suitable baffles or other similar devices.

Collotype of phototype is a process of some interest, as the film, which is made especially hard with alum or some similar substance, is used as the actual printing surface. It is largely used for printing illustrated postal cards. There are a number of others, such as heliotype, stannotype, etc., but these deserve a place in a separate discussion. The subject of photolithography, however, is of interest to gas men, especially in connection with a former article recently published on the general subject of lithography. In this process zinc or aluminum plates are

used as a rule in place of stones. These plates have the same affinity for fat ink as stones, the method of dealing with them being practically the same as with stones, and the description may be taken as applying to both. The stone itself may be rendered sensitive by coating it with bichromatized gelatin, then exposing it under a reversed negative of the required subject and treating the hardened film as in the case of collotype. Often, however, another plan is adopted and a sheet of unsized or transfer paper is taken and sensitized. It is then exposed under a negative moistened and rolled with transfer ink, which is of a specially fatty nature and adheres only to the parts hardened by exposure, which are unaffected by the moistening and remain dry. This inked sheet is laid on the stone and the two are pressed tight together, heat being usually applied (see Fig. 3). After further moistening the paper is peeled off and the stone remains with the ink drawing behind. The usual methods of lithography are then followed, a full description of which have already been given in a preceding issue.

In conclusion, the author hopes that it will not be considered that any attempt has been undertaken to outline the processes in such a way as to serve for a full and complete description of what is involved. Rather has an effort been made to give just those features which will make the story clear to the gas man, who should find a clear, open field for his ambitions.

Hope Natural Gas Erecting New Pumping and Compressing Station

The Hope Natural Gas Company of Parkersburg, W. Va., has under construction one of the largest pumping and compressing stations in the State at Grantsville, near what is commonly known as the lamp black factory site. The main feature of the plant will be a huge and powerful pump, which draws the gas out of the wells by a suction pressure on the line equal to the high pressure wells, thus preventing gas from high pressure wells from flowing into low pressure wells when the two wells are turned into the same line.

The intake line, 10 in. in diameter, extends up into the Russet country and the discharge line, 12 in. in diameter, extends from the compressing station to Burnt House, where it connects with one of the company's main lines. The machinery necessary to run these immense compressors will be quite the largest ever brought into this county. The compressor will be run by six 500-h. p. National Transit gas engines, making a total of 3,000 h. p. These engines and compressors will all be set on one immense concrete block, 116 ft. long, 64 ft. wide, and 3 ft. thick, containing 22,272 cu. ft. of concrete, the top of which block will be 7 ft. under ground. To this giant slab of concrete will be built and anchored the individual concrete engine blocks, which will be an additional 6 ft. high. All this machinery will be housed in a building built of sheet iron and known as the "pump house." Near by is to be the auxiliary house which will contain lathes and various manufacturing and repairing machinery. While there is enough material arriving to permit the work to progress there is still much in transit, and a great deal of the machinery has not yet left the factory. The station will be completed and ready for operation about the first of November of this year.

Recommends that All Meters Ten Years in Service Be Opened Up for Repairs

H. A. Norton Gives New England Guild of Gas Managers Findings from Unique Testing Opportunities

We have had repeated inquiries asking what effect the gas manufactured during the past four years of the war period has had upon the meter, particularly affecting its accuracy. It has been the endeavor of the manufacturers to maintain the accuracy of the meter, their reliable service and lifetime, under the changing conditions of the manufacture and use of gas. The following records of tests demonstrate that we have been successful, declared H. A. Norton in an address before the New England Guild of Gas Managers at Boston.

We find that few companies analyze their test results for any specified period. It was our privilege to test for a gas company at their works, in December, 1917, 535 meters. This company began operating in 1901 and has supplied coal and water gas of varying proportions. Some years ago they used benzol for enrichment. In the past few years they have changed from candle to the B.t.u. standard. None of the meters tested was over seventeen years old, and they were all new meters when originally installed. A few of these meters have been repaired, but all periods of service cover the time the meter has been in use since it was new or repaired. Some of these meters have been tested prior to our test and returned to service, but this company has no periodic test date. Of these 535 meters tested, 80 per cent were correct. Of the 20 per cent incorrect meters, 14 per cent were fast, 5 per cent slow and 1 per cent N. R. All meters not more than 2 per cent fast or slow are correct according to law. Twenty-five per cent of the 428 correct meters were on the fast side; 75 per cent of the 428 correct meters were on the slow side. The seventy-five fast meters were 288 points, or an average of 0.038 per cent fast; the twenty-four slow meters were 108 points, or an average of 0.045 per cent slow. One meter was 11 per cent fast (fourteen years in service); one meter was 24 per cent slow (fifteen years in service).

Classifying the 535 meters tested we find:

1 to 5 years' service, 88 per cent correct—8 per cent fast, 3 per cent slow, 1 per cent N. R.
1 to 7 years' service, 86 per cent correct—11 per cent fast, 2 per cent slow, 1 per cent N. R.
1 to 10 years' service, 85 per cent correct—11 per cent fast, 3 per cent slow, 1 per cent N. R.
1 to 17 years' service, 80 per cent correct—14 per cent fast, 5 per cent slow, 1 per cent N. R.
6 to 10 years' service, 80 per cent correct—15 per cent fast, 3 per cent slow, 2 per cent N. R.
11 to 17 years' service, 60 per cent correct—27 per cent fast, 12 per cent slow, 1 per cent N. R.

This company has 12,000 meters in service. These meters are in a location practically surrounded by salt water. A considerable number are in a shut-off or locked condition during the winter months. These meters, however, were removed for different causes and from different sections of the territory, and, we believe, are typical of the rest of the meters in service. The fact that none of these meters was more than seventeen

years old may have some bearing upon the results of these tests. This certainly demonstrates that meters manufactured in recent years are holding their accuracy as well as meters made in former years.

Tests in Inland Territory

The other tests are results obtained by a company located forty miles inland. In 1899 this company established a periodic test on a five-year basis. A card index was at that time installed, which gives the history of each meter. The question arose in 1909 if correct meters after ten years of service should be continued in service. In order to determine a period when correct meters should be opened, these ten-year-old correct meters were put back in service.

This company has been operating sixty years. Prior to 1907 it manufactured coal gas. Since then it has manufactured coal and water gas of varying proportions. Some years ago the company used benzol for enrichment. In the past few years it has changed from candle to B.t.u. standard. It has 5,000 meters in service.

For the fifteen months from January 1, 1918, to March 31, 1919, there were tested 2,201 meters, or 44 per cent of the number in service; 1,617 of these meters were tested in the year 1918, or 32 per cent of the meters in service. We took the fifteen months' period to get a record up to date, since the meters for periodic test are removed the first three months of each year. Of these 2,201 meters tested, 1,728, or 78½ per cent, were correct, 11½ per cent were fast and 10 per cent slow. Thirty-five meters, or 2 per cent of the total tested, were N. R. or D. P. G. The 253 fast meters were 1,255 points, or an average of 0.05 fast. The 220 slow meters were 1,303 points, or an average of 0.06 slow. Ten meters were from 10 to 13 per cent fast. Twenty-one meters were from 10 to 70 per cent slow.

Of the ten meters 10 per cent or more fast, one was in service five years, one was in service six years, eight were in service ten or more years.

Of the twenty-one meters 10 per cent or more slow, two were in service five years or less, four were in service six to ten years, fifteen were in service eleven or more years.

Of the thirty-five N. R. or do not pass gas meters, six were in service five years or less, two were in service seven years, nine were in service from ten to fifteen years, eighteen were in service fifteen or more years.

This shows that 77 per cent of the N. R. or do not pass gas meters were in service ten years or more.

Classifying the 2,201 meters tested we find:

1 to 5 years' service, 80 per cent correct—11 per cent fast, 9 per cent slow.
1 to ten years' service, 79 per cent correct—12 per cent fast, 9 per cent slow.
1 to 20 years' service, 78½ per cent correct—11½ per cent fast, 10 per cent slow.
6 to 10 years' service, 85 per cent correct—9 per cent fast, 6 per cent slow.
11 to 15 years' service, 72 per cent correct—14 per cent fast, 14 per cent slow.
16 to 20 years' service, 52 per cent correct—24 per cent fast, 24 per cent slow.

The following tabulation shows the accuracy of the meters and the length of service when last tested. Keep in mind the regular test period. All meters showing a service of five, ten, fifteen and twenty years were removed for the five-year test. All meters showing a service of six, seven, eight and nine years had been tested five years previously and the incorrect meters eliminated. This accounts for the small proportion of incorrect meters showing six, seven, eight and nine years' service.

1 year service—127 = 85 per cent correct
2 year service—154 = 90 per cent correct
3 year service—167 = 86 per cent correct
4 year service—107 = 82 per cent correct
5 year service—326 = 70 per cent correct + five-year test
6 year service—321 = 87 per cent correct
7 year service—209 = 84 per cent correct
8 year service—137 = 87 per cent correct
9 year service— 92 = 88 per cent correct
10 year service— 72 = 70 per cent correct + five-year test
11-15 year service—310 = 72 per cent correct + five-year test
16-20 year service—179 = 52 per cent correct + five-year test

The cost of repairs and replacements of meters to this company for the past three years per 1,000 cu. ft. of gas sold was as follows:

1916	$0.0129
1917	0.0162
1918	0.0132

This company removes the idle meters. If they were left in a shut-off or locked condition for a period of six or twelve months this would be better for the meter and would save considerable expense. If ten-year correct meters were opened for repairs it would not add greatly to the cost of repairs and replacement. It is estimated that 20 per cent of the meters in service are from twenty-five to thirty-five years of age. Less than 2 per cent of the meters in service were condemned in the past ten years.

From the above records it must be evident that all meters should be periodically tested, and all meters should be repaired after ten years of service. The additional expense for doing this work will be slight after this system has been established, but it should be anticipated and considered in the present and future selling price for gas.

In the past sixty years the Glover type of gas meter has proven its accuracy, reliable service and durability. With such a record we are apt to overlook the advisability and necessity of periodic tests and repairs.

A Paint for Rusty Pipe

T. J. Tonkin, of the Frankfort (Ky.) Natural Gas Company, submits this paint formula to prevent further corrosion and to give a smooth, everlasting coating to rusty pipes or tanks, as a "Wrinkle" for the Natural Gas Association of America:

Take a gallon of coal tar, a quart of kerosene oil, a pint of Portland cement; mix and heat until it comes to a thorough boil, and apply to surface to be painted while still warm. If thoroughly mixed and heated this paint will last indefinitely above or below ground.

THREE-TON PEERLESS TRUCK

The Motor Cycle Obsolete in Transportation System of Des Moines Company

D. P. Allen Describes System Employed—Keeping Up the Cars, Reducing Mileage Costs and Reducing Mileage Per Order

What follows is simply a description of the transportation system of the Des Moines Gas Company, explained D. P. Allen in his paper on that subject before the annual convention of the Iowa District Gas Association. It is realized that some of the methods found most successful in this case would be unsuited to other companies, and also that some of the methods which other companies are using successfully are not adapted to our conditions.

The city of Des Moines has an area of about fifty-four square miles, and a population of about one hundred and thirty thousand. We have approximately 240 miles of distribution mains, and about 27,000 meters in service. This gives 500 meters per square mile and 113 meters per mile of main—low figures compared with many cities in the East, but probably fairly near the average of the companies represented here.

Divided in Half by River

The city is roughly divided in half by the Des Moines River. The works, garage and distribution shop are located on adjoining blocks in the south-central part of the city. The garage is combined with the works, storeroom and repair shop.

The business section of the town and nearly all of the residence section to the west and northwest are well paved, and the east and northeast sections have many of the principal streets paved. Many smaller streets of the east side are unpaved, and the southeast and southwest sections are almost entirely unpaved, and at certain seasons offer some choice samples of Iowa mud roads. Out of a total of 497 miles of streets, 36 per cent, or 179 miles, is paved. Geographically, at least, the city is pretty much on the level, so that we do not have the hill climbing to contend with that proves such a transportation problem for some companies.

Our present transportation equipment is shown by the Table 1. The cars have been divided into groups according to their construction and the purpose for which they are used.

The cars in the first group are all stock cars of well-known makes, and need no description. They are used mainly for executive work, and carry only first-aid kits and tools necessary for car repairs.

Trucks Equipped with Special Bodies

The trucks in the second group have special bodies and running gear designed for their work, and as they have been in use long enough to demonstrate their usefulness and practicability it seems worth while to describe them somewhat in detail. The service foreman's truck is shown in Sketch 1. In addition to handling the

SKETCH 1—SERVICE FIREMAN'S TRUCK

SKETCH 2—DRIP TRUCK

service work the service foreman takes care of most of the street leaks and emergency jobs and his truck has been designed and equipped to meet both conditions. After listing the material necessary for this work we realized that it was too great a load for a standard Ford chassis, and equipped the truck with auxiliary rear springs. As shown in Sketch 1, the covers to the side compartments are hinged on the inside to tilt in, enabling the driver to get materials from the side of the truck. The side rails form a safe seat back for men carried in the truck.

Table 2 shows the material that the service foreman regularly carries in this truck. It enables him to exchange defective tools from the service boxes, and replenishes supplies of oil, dope and waste, to keep the first-aid kits in the service boxes in good shape, to preinspect and, in many cases, supply all the material for repair jobs, and to take a gang on an emergency job and have most of the material he is likely to need. The truck is also equipped with a drawbar to be used for moving service carts from one job to another.

The drip truck shown in Sketch 2 consists of a Ford chassis with a "Will-Holl" 1-ton attachment substituted for the Ford rear system. It has a platform body on which rests the skids supporting the 300-gal. elliptical drip tank. To the rear, a small platform, attached to skids carries the drip pump which discharges directly into the tank. The handle of the pump comes to a convenient height for a man to pump standing on the ground. The tank body with its skids is held in position on the platform of the truck by side rails and by two pins through the skids and frame of the platform body. To remove the body, it is simply necessary to pull these two pins and slide it off to the rear. The other body used on this truck which is shown in Sketch 3 converts it to what we call the "blow-out" truck, as it is the equipment we use for clearing frozen services with hot brine and com-

TABLE 1

Transportation Equipment, Des Moines Gas Company

Used By	Make	Type of Body	Remarks
President	Hudson Super-six	Touring	Stock car
Engineer	Hudson Super-six	Cabriolet	Stock car
Commercial agent	Ford	Sedan	Stock car
Engineer's assistant	Chevrolet 490	Runabout	Stock car
Collector	Ford	Runabout	Stock car
General main foreman	Ford	Touring	Stock car
Service foreman	Ford	Special truck	Auxiliary rear springs
Drip man	Ford	Special tank	Will haul attachment
Brine gang	Ford	Special interchangeable with drip tank	Will haul attachment
Shop Foreman	Ford	Special truck	See Table 3 (Ford truck equipment) for material carried on these trucks
Fitting inspector	Ford	Special truck	
Special appliance inspector	Ford	Special truck	
Night shop man	Ford	Special truck	
Emergency man	Ford	Special truck	
Meter setters and complaint men	Ford	Seven of these trucks	
Garage car	[illegible]	Special truck	Carries all necessary emergency car repairs
One-ton delivery	Ford	Platform body	Kelley 1-ton attachment
Three-ton delivery	Peerless	Platform body	Used only for main deliveries and heavy hauling

The following equipment is nearly obsolete.

MOTORCYCLES

Emergency shop man	Indian	Single-cylinder model of 1914-1915
Service inspector	Indian	Single-cylinder model of 1914-1915
Fitting inspector	Indian	Single-cylinder model of 1914-1915

Fitters' bicycles with tool boxes

One horse, used with dump cart, large box body cart, express wagon and scraper

TABLE 2

Tools Carried in Service Foreman's Truck

Spade, sledge hammer, prospecting bar, shovel, frost bar, 4-ft. rubber hose, pick, long chisel bar, tallow muslin, soap, hammer, cold chisel, three wheel pipe cutters, 18-in. trimo wrench, 1 pair pliers, 14-in. trimo wrench, diamond point, cutting tools, one set caulking tools, hemping iron, ratchet stocks with dies from ¾ to 2 in., pipe taps from ¾ to 2 in., blow pump, drip pump, medicine kit, flashlight, one ladder, red lanterns and danger signs, 2 gal. coal oil, 2 gal. cutting oil and 50 lb. red lead.

FITTINGS

Plugs ¾ to 2 in.	1¼-in. ells
1½-in. street ell	1¼-in. tees
1¼-in. long screw	1¼x1x1¼-in. street tees
1-in. meter cock	½ lb. hemp
1¼x¾-in. reducer	½ sack cement

SKETCH 5—RIGHT SIDE VIEW

pressed air. It is simply a box body with a 50-gal. steel barrel, and compartments for holding twelve compressed air tanks and six 2-gal. galvanized oil cans. The barrel is boxed in and heavily lagged with magnesia and has filling, draw-off and vent cocks. There is a tool compartment for wrenches, dope cans, plugs, cold chisels, etc. In practice, we fill the 50-gal. barrel with boiling brine when starting out, and draw it off into the small

SKETCH 3—BLOWOUT TRUCK

cans as needed to pour into the frozen services. The insulation on the barrel is sufficient to keep the brine hot all day.

DIFFERING ONLY IN EQUIPMENT

The trucks in the next group all have the same type of box body, and differ only in their equipment, which is shown in Table 3. A Ford runabout is the basis of the truck. The torpedo back and rear fenders are removed, and 2¼ x 2¼ x 3/16 in. angle irons 5 ft. 4 in. long are bolted to the body making a bed for the box 4 ft. 9 in. x 2 ft. 9 in. and extending back of the runabout bed 2 ft. 2 in. Side boards 10 in. high cut and beveled to fit the curvature of the seat are screwed to the bed; 2½ x 2¼ x ¼ in. angle irons bolted to the bed extend 24 in. above the bottom of the box, and support the meter shelves and meter retaining bars. The meter shelves are 3 ft. 6 in. x 12 in. and project over the rear wheels, taking the place of fenders. Sketches 5, 6 and 7 show the general appearance of these trucks.

The work of the shop foreman is, of course, mostly executive, and his truck is used mainly for inspecting emergency calls and work that calls for no special equipment, and ordinarily he carries only a first-aid kit and a few fittings.

The fitting inspector's duties are as follows:

To pre-inspect and measure all fitting jobs that require more time and material than the meter truck men have.

To supply from the pipe and fitting that he carries, the material for small jobs.

To supply pipe, fittings and materials found necessary

TABLE 3

Ford Truck Equipment Table

(Showing equipment of Ford trucks in Group 3)

All trucks carry a first-aid and asphyxiation kit.

All trucks have car repair tool boxes on left running board containing extra spark plugs, 30x3-in. and 30x3½-in. inner tubes, tire pumps, jacks and tire irons. Tire chains are carried in a separate compartment in tool box, as are first-aid kits mentioned above

Special equipment of the various trucks.

Shop foreman's truck, none. Carries tools and material only as needed.

Fitting inspector's truck.

Special fitting bin. Pipe in lengths and quantities dependent on the pre-inspection orders carried. Tool box on right running board containing replacement tools and material for fitters, tool kits and a few special tools, such as hacksaw, boiler shell drill, chain drill, burring reamer, etc.

Special appliance inspector's truck.

Small leather tool grip. U-gauge, Bristol recording pressure gauge, service governors, appliance repairs as needed.

Day and night emergency men's truck.

Running board fitting boxes, bell pumps, drip pumps, drip cans, lanterns, danger signals, digging tools, soap and tallow muslin. Small tool boxes.

Meter setters or complaint men's truck.

Bell pumps, stepladder

Drip pumps, drip cans

Running board fitting boxes

Incandescent material boxes.

Pipe—5 ft. of ⅜-in., 5 ft. of ½-in., 10 ft. of ¾-in.

Small tool boxes containing six-way box stock with dies ⅛ to 1 in., No. 1 pipe cutter, 10 and 14 in. pipe wrenches, dope and oil cans, brown soap. The ordermen generally carry their screwdrivers, pliers, reamers and meter washers in their pockets or in small leather tool kits

for the work that were not ordered on the pre-inspection measurements.

To collect all material left after completing jobs.

To make all housepiping inspections.

To carry sufficient tools and material to keep the fitters' kits in good condition.

The equipment of the truck found necessary to accomplish the above work is shown in the equipment Table 3. The fitting bin is the only special part of this equipment. As shown on Sketch 9 it is made with a number of small compartments so that a large variety of fittings can be carried. This fitting bin is placed at the front end of the truck body. It rests on angle iron across the sides of the truck body leaving a space underneath it to carry two fitters' tool boxes. There is room enough in the body of the truck for a fitter's tool box or a stove or large tool box. Enough pipe can be carried in the pipe rack for several jobs and meters called for on fitting jobs are carried on the meter racks.

The equipment of the special appliance inspector's truck is shown in sufficient detail in Table 3. This work covers the inspection and repair of hotel and industrial appliances, automatic heaters and special domestic appliances and the material used is mainly repairs for these.

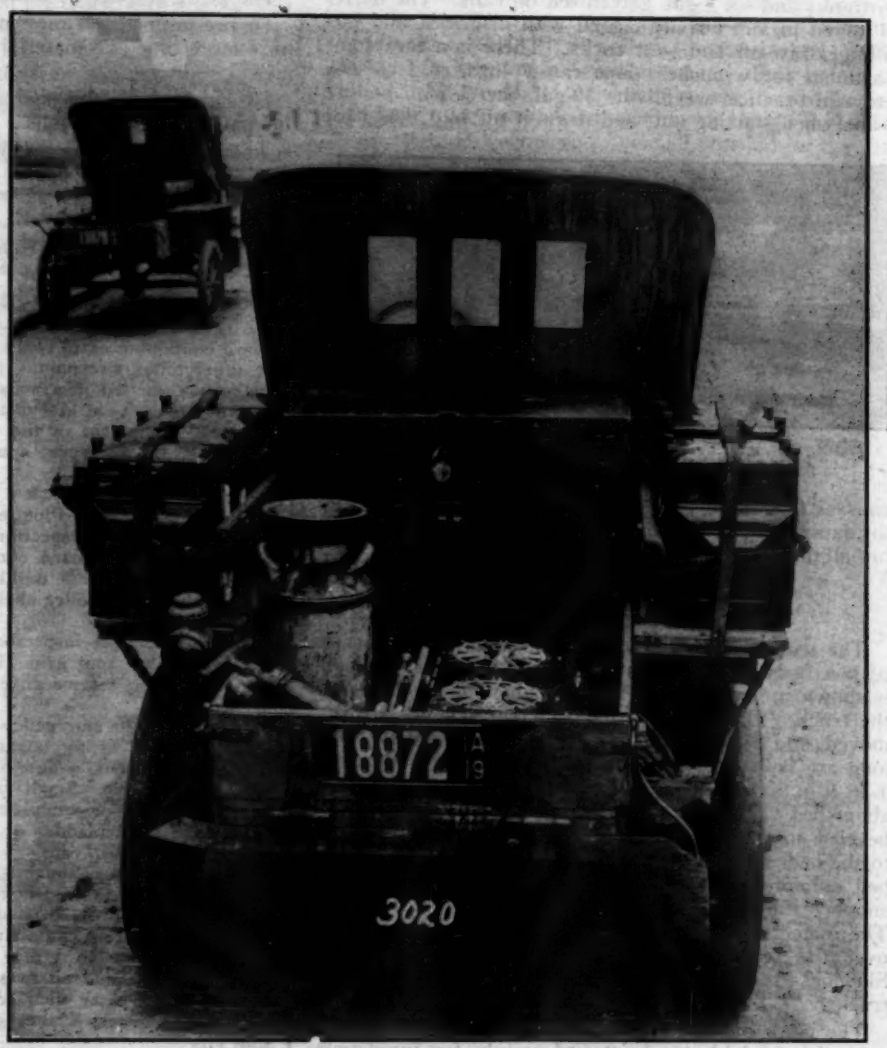
SKETCH 6—LEFT SIDE VIEW, ORDERMAN'S TRUCK

WHAT THEY ATTEND TO

The emergency man, whose duties are mainly to attend fire calls, leaks, stuck meters, and no gas orders, carries meters, fittings for emergency use, bell pump, drip pump, drip cans, and main and service tools when it seems probable that a reported leak may be a street leak.

The night shop man, who is also night emergency man, carries the same equipment as the day emergency man, and in addition his truck has a good spot light run by a storage battery. It has proved very valuable in spotting house numbers at night in poorly lighted streets and in searching for drips or main leaks.

The remaining seven trucks of this group are the meter setters' and complaint men's, or, as we ordinarily call them, ordermen's trucks, as their work is so diversified that neither of the first terms adequately describes it. We do not attempt to split this work and have meter setters, stove men and incandescent men, as is the generally followed practice in larger situations. Every truck is equipped to set meters, stoves and small appliances, install or repair lamps, attend to any leaks, no gas or adjust complaints, or ordinary appliance repairs—in fact to handle any order that a man encounters in ordinary distribution shop work.



SKETCH 7—REAR VIEW, ORDERMAN'S TRUCK

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SIXTIETH YEAR

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As the Journal Views It

The Passing of an Era

Well within the memory of man, the gas and electric companies were considered competitive industries. To-day, the hang-back viewpoints of many to the contrary, they are co-ordinating industries.

It is to the credit of the gas industry that it was within its ranks that a realization of this fact first became practically general.

It is futile to-day to attempt to sell gas service on the basis of the fire hazard of electricity. It is equally futile to attempt to sell electric service on the basis of the asphyxiating or explosive possibilities of gas.

An excellent condition, indeed, would it be were all the forces of nature that man has harnessed to his service safe, even against foolhardiness and the remote possibility. Even the piping of water into our houses brings with it its own hazards.

The railroads have cost their toll of lives and property: the horse and wagon, the automobile, the sewer system, the aeroplane—are still exacting them.

Yet who would be without them. And in all cases in proportion to the benefit derived the cost is negligible.

So it is with gas and electricity. They have their hazards, both of them. They are hazards that careful use and attention will reduce almost to zero and which carelessness will brood into menacing factors.

But both are public services well-nigh indispensable.

Humanity cannot be without them. Therefore it devolves upon those who supply them to work unceasingly to better them, and to avoid belittling either even when selling the other.

The Let Up in the Conventions

The bulk of the year's conventions are behind us. We can with reasonable assurance therefore look back and compare them with the conventions of previous years, even war years.

Some remarkably good papers were brought forth this year, some exceedingly helpful discussion. Yet somehow on the whole there is a tendency to feel disappointed. The profit, the inspiration, that marked the conventions of former years had not seemed to be present in an equal or greater degree this year.

What is the cause? Is it merely the natural reaction from the intensified activity of the recent past? Or is it from a growing confidence in the ability of the American Gas Association to do the whole job and man's naturally lazy inclination to shove his tasks upon other shoulders when he encounters such shoulders capable of carrying them?

Gas Companies Supplying Motor Fuel

The testimony at Chicago is encouraging in that it indicates to a degree, the exent to which a principal gas company is going into the business of producing motor fuel.

It is to be regretted that this particular company is at present being harried at every point. A little forbearance upon the part of the wolves that beset it and who knows but that every one could score a triumph.

There is ample reason to believe that the production of benzol as a motor fuel can be made a profit producing by-product. The greater the number of profitable by-products the gas company turns out, the cheaper it can sell its primary product and that at a greater profit.

But situations like that at Chicago demoralize the whole organization from the top to the bottom. It would be to the public weal for the champions of the people to let up on the Peoples' Company to a degree at least, even though their crusade be justified, which is by no means established.

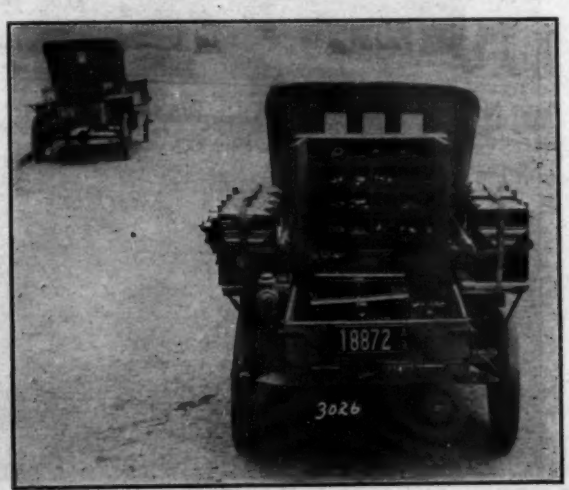
The Motor Cycle Obsolete in Transportation

(*Continued from page* 510.)

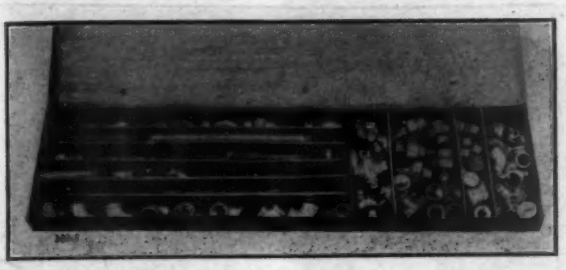
Referring to the equipment Chart 3 we see that each truck carries an incandescent material box, running board fitting box, bell pump, drip pump, drip can, stepladder, pipe and meters. The bell and drip pumps are the standard pattern and need no description. The drip cans are ten gallon wide mouth milk cans. They are strongly constructed, have tight covers and serve their purpose very well. The stepladders are some we made ourselves. They are four-footers, and lighter, stronger and more compact than the standard type. Each truck carries four pieces of pipe 5 ft. long, one each of ⅜ in. one ½ in and two of ⅛ in. pipe. This has proved sufficient for ordinary requirements. The other two articles carried namely the running board fitting box, and the incandescent material box are more or less innovations, and have proved of such value as to seem worth a detailed description.

Determining What Will Be Wanted

The running board fitting box was designed to be carried on the right running board of a Ford truck, and to hold enough fittings to supply the needs of any ordinary day's work. It replaces larger fitting boxes formerly used and carried in the back of the truck, which ordinarly were more or less junk boxes containing a number of fittings of the same kind and generally failing to have those most needed. Before laying out the running board box a very careful examination was made of the work cards for fitting jobs done by truckmen for several months previous to determine the number and kind of fittings most frequently used and the box was made to hold these and no more. There are two boxes for each truck, to be used on alternate days; the one not in use to be refilled during spare time. The plan of the box with the fittings it contains is shown by Sketch 4 and Table 5. The advantages of this type of box are many and obvious. A filled box is put on each truck in the morning and the truck driver does not have to think about pipe and fittings. The contents of the box are adequate to any ordinary job, and all is in plain sight,



Sketch 9.—Rear view, fitting inspector's truck



SKETCH 4—RUNNING BOARD FILLING BOX

no delay due to lack of fittings or difficulty in finding them. Its location leaves the body of the truck free for other things, keeps the fittings clean and uninjured and promotes better work. By using two boxes and by filling them during odd times, the cost of filling is kept down, and it is easy to check the fittings used by every man with the work card that he turns in. The original cost of the boxes is not high, and there is almost no wear-out to them.

The incandescent material boxes are an outgrowth of fiber boxes formerly used to carry lamps, lamp glassware and repairs. These fiber boxes were not divided into compartments, and the material was simply packed in carefully. The breakage loss with these boxes was very high, small parts were easily lost, and much time was lost hunting the desired material. It was not possible to carry enough to do all the orders for the day and this resulted in delay and additional calls. To overcome these difficulties it was decided to build boxes capable of carrying enough lamps, and lamp repairs to enable the truck men to complete all orders taken out, phoned out or picked up during the day. A study was made of completed work cards to determine the material that it was necessary to carry and the boxes were then built to carry all of it, easily accessible and protected against breakage. They were made of ⅝ in. poplar, bound on all edges with galvanized iron, fitted with heavy corners and handles. The lower part containing glassware and boxed lamps, has separate compartments which are padded and each shade or globe is protected by a pad. The upper part contains two trays, one for tubing and the other for small repairs, mantles, cylinders and miscellaneous material. This tray is divided into compartments to protect the material. Two of these boxes were made for each truck, a total of sixteen boxes, and the cost per box was about $12. A careful comparison of the breakage with these boxes and their predecessors shows that the saving in two months' use was nearly equal to the cost of the new boxes. The boxes have been in use for about three years. We have changed the list of material carried several times to meet changing demands, but the construction of the boxes and method of using them have proved thoroughly satisfactory. Sketch 8 shows the appearance of these boxes and Table 6 gives the present equipment carried.

The garage car used for truck breakdowns and repairs of trucks on the street properly belong under garage equipment and will be described later under that heading.

We have two delivery trucks, a one ton and a three ton. The one ton is a Ford with a Kelly 1-ton attachment and the 3-ton is a Peerless. Practically all deliveries except cast iron main are made with the one ton truck. This has a platform 5 ft. 7 in. x 11 ft. with a meter rack at the front of the platform elevated 12 in. above the platform. The cab is 47 in. wide and the body 67 in. wide, giving a space of 10 in. on both sides of the cab so that full lengths of service pipe can be loaded on the sides of the platform and allowed to project over the front fenders instead of behind the truck. As this truck was originally made we had 32 x 3½ solid tires on the rear wheels. These were so narrow that the truck was very easily mired, and when it came to a renewal of tires, double tires with wide rims and felloe bands were put on to overcome this trouble.

The 3-ton Peerless truck has a platform body 14 ft. x 7 ft. and a meter rack just back of the cab much like the one on the one 1-ton truck. For several years all deliveries were made with this truck but since the purchase of a light truck the use of the large truck has been limited to heavy deliveries. Before getting a light truck the relative economy of heavy and light trucks was a much discussed problem. It took but a short period of light truck delivery to prove to us that for our situation it was by far the most economical.

The remaining items on our list of Transportation Equipment can be passed by with very little description as they may be fairly classed as obsolete. We have three motor cycles but have discontinued the use of them. They were formerly used by the fitting inspector, service inspector, emergency man and shop foreman, but the number of bad accidents that we had with them, coupled with a very strong prejudice that developed among the men against riding them, caused us to abandon their use. Furthermore, they proved dangerous on wet pavement and practically useless off of the pavement in wet weather. They had many points to commend them, however. The first cost was small, the operation cost low and a man would make better time than with a truck.

TABLE 5

List of Fittings Carried in Running Board Fitting Boxes

NIPPLES

1—⅜x2-in.	1—½x4-in.	2—¾x4-in.
1—⅜x4-in.	1—½x5-in.	1—¾x10-in.
1—⅜x6-in.	1—½x6-in	2—¾x6-in.
1—½-in. close	2—¾x5-in.	1—¾x7-in.
1—½x2-in.	2—¾-in. close	1—¾x8-in.
1—½x3-in.	2—¾x2-in.	1—¾x12-in.
1—½x7-in.		1—¾x16-in.

FITTINGS

1—⅜-in. ell	1—½-in. tee	1—1-in. plug
1—⅜-in. street ell	2—½-in. pipe straps	1—1-in. cap
1—⅜-in. bracket ell	1—½-in. union	2—1x¾-in. bushings
1—⅜-in. coupling	5—¾-in. ells	1—¾x½-in. red. ell
5—⅜-in. plugs	5—¾-in. st. ells	1—¼-in. tee
5—⅜-in. caps	5—¾-in. c'plings	1—¾-in. meter cock
2—⅜-in. pipe straps	5—¾-in. plugs	1—¾x⅜x¾-in. tee
1—½-in. ell	5—¾-in. caps	3—¾-in. pipe straps
1—½-in. street ell	5—¾-in. unions	
1—½-in. coupling	4—¾x½-in. bushings	
2—½-in. plugs	1—¾x½-in. red. coup.	
2—½-in. caps		

6—¾-in. stove bolts
6—3/16-in. stove bolts
A few nails
10—5-lt. tin meter caps
6—10-lt. tin meter caps
4—30-lt. tin meter caps
6—5-lt. meter swivels and nuts
2—10-lt. meter swivels and nuts
2—5-lt. to 3-lt. adapters

TABLE 6

List of Material Carried in Incandescent Material Boxes

LAMPS—	1—⅛ pillar cock
2—647 lamps complete	1—⅛ ell cock
1—71320 lamp complete	1—¼ ell cock
1—173 lamp complete	1—⅜ ell cock
2—Welsbach Jr. lamps, no globe or ring	1—Detroit Jewell cock
2—776 C.E.Z. lamps	1—Clark Jewell enamel
	2—Eclipse enamel
	2—Eclipse, black
GLASSWARE—	
1—Clear holophane shade	MISCELLANEOUS—
1—Satin holophane shade	1—2-ft. stove tube
2—447 globes	1—4-ft. stove tube
2—302 globes	1—6-ft. stove tube
2—777 shades	1—6-ft. gas iron tube
2—6-in. air chimneys	1—6-ft. metallic tube
3—320 cylinders	1—Portable lamp tube
2—317 cylinders	24—Bray burners
2—326 cylinders	1—No. 71 burner
	4—Gauzes for 776 lamp
MANTLES—	3—No. 90 magnesia tips
24—C.E.X. mantles	4—No. 4 pilot tubes
6—Reflex No. 1	4—No. 6 pilot tubes
6—No. 33 Reflex	4—No. 22 pilot tubes
4—991 or No. 107 mantles	4—C.E.Z. pilot tubes
2—No. 93 Jr.	4—No. 3428 pilot tubes
	3—No. 4 by-passes
COCKS—	3—No. 6 by-passes
1—⅛ D. I. cock	2—Junior by-passes
1—⅛ ind. cock	1—Ground joint
1—⅜ hose cock	1—Gooseneck
1—½ hose cock	3—317 cylinder rings
1—¾ hose cock	1—Stiff bracket
1—⅛ pillar cock	1—1-swing rope bracket

We still have the fitters' bicycles with sheet-iron tool boxes large enough to carry a complete fitter's tool kit fitted into the frames. We use them occasionally for jobs close to the shop or for a condition where a fitter has several jobs in the same neighborhood, but some distance from the shop. In this latter case the fitting inspector with his truck carries the fitter with his bicycle and tool kit to the first job and the fitter uses the bicycle between jobs. The weight of the bicycle with tool box and tool kit is approximately 100 pounds and the fitters

SKETCH 10—FITTERS' BICYCLES, SHOULDER TOOL BOX AND TOOLS

TABLE 7

Tools Carried in Fitter's Bicycle Tool Boxes and Shoulder Tool Boxes

Stock and dies, ⅛ to 1 in.	1—Oil can
1—Pipe vise	1—Floor gauge or flat file
2—Lag screws, 3 in. long	1—Cold chisel
1—10-in. wrench	1—Feeding bit
1—14-in. wrench	4—Wood bits, ⅜ to 1½ in.
1—10-in. flat file	1—Wood chisel
1—3-corner file, 6 in. long	1—Keyhole saw & handle
1—Brace	1—Screwdriver
1—Pipe cutter	1—Soap can
1—Clawhammer	1—Can opener

worked harder pushing the bicycle from job to job than they did fitting. Furthermore, we had difficulty in obtaining bicycles strong enough to stand up under the load they had to carry. The bicycles were always a source of complaint from the fitters riding them and were the cause of our losing several good fitters.

The remaining member of our Transportation Equipment, the horse, has been classed as obsolete for some time in spite of which it proves very useful for certain sorts of work. Our purifying boxes are bottom dumping and the horse and dump cart can be used in the purifying house for removing oxide where it would be unsafe to use a motor vehicle. We sometimes utilize the horse with a scraper for backfilling main ditches, also for hauling sand or coke around the works. There are certain locations where our main drips are nearly inaccessible for a motor vehicle in wet weather and here the horse and light drip wagon prove valuable.

LOADING AND DISPATCHING

The loading and dispatching or routing of the trucks are two more phases of a gas company's transportation problem that must necessarily be described as they

SKETCH 8—INCANDESCENT MATERIAL BOX

ONE-TON "KELLY" FORD DELIVERY TRUCK

relate to the work of the distribution system and what has previously been said relative to the transportation system as a whole applies in particular to them, viz., that the conditions determining the best operating methods differs so materially for every situation that no one method can be recommended as suitable for all situations. Efficient loading and dispatching are vitally important factors of a successful transportation system and the saving of time in loading and unloading and of unnecessary miles traveled by the trucks will well repay careful study.

We have attempted in our own system to reduce the loss of loading time, and miles traveled to accomplish a certain amount of work, to a minimum, and with our present loading system everything necessary for the day's trip of the ordermen's trucks is in position on the trucks before starting time, and ordinarily every truck leaves the shop within two or three minutes after 7:30 a. m. and the delivery truck is backed up to the platform ready to be loaded. This saves much of the time and confusion resulting from loading during working hours. This early loading is accomplished as follows: The night shop man gets all meters from the meter room and places them in position for loading; he fills all fitting boxes and places them in their respective loading position; he puts up all fittings and pipe to be delivered for fitting jobs, and at 5.30 brings all trucks from the garage to the shop, backing them up to the loading platform. The storekeeper comes on duty at 6.00 a. m. On the previous day he has refilled all of the incandescent material boxes to their standard equipment. To this he adds, in the morning, any special material or appliances that may be called for and takes the filled material boxes to the loading platform. The early truck man relieves the night shop man at 6.30 a. m. He puts the material, placed in loading position by the night man and storekeeper, on the trucks so that when the men come on duty at 7.30 a. m. running board fitting boxes, incandescent material boxes, meters, pipe and any special appliances or material that the orders call for are in position on their trucks.

The loading and routing of the delivery trucks is handled by the storekeeper who is held responsible for any failure to deliver, shortages or injuries to appliances in delivery. A carefully worked out maximum loading schedule is employed to prevent overloading the truck. As the one delivery truck makes all the deliveries over the entire town we frequently split the load into east side and west side loads to prevent an unnecessarily long haul with a heavy load.

Dispatcher a Vital Point

It is probably safe to say that for our situation the dispatcher by his good judgment or lack of it can decrease or increase the transportation operating costs more than any other person. It is just as great a factor of efficiency to reduce the truck mileage necessary to do a certain number of orders as it is to reduce the cost of truck operation per mile and this reduction of truck mileage is the dispatcher's work. He must be thoroughly familiar with every street and alley in the city and know every short cut from one part of it to another; he must know which streets are good and which are bad. He must memorize the route of each truck driver and keep in his mind their approximate position at all times. He must be able to remember any peculiar conditions surrounding any particular order and to exercise good judgment in doing or not doing orders out of the ordinary. In routing the ordermen's trips he must avoid overlapping of territory and at the same time make the boundaries of each orderman's territory flexible enough to avoid excessive traveling of one man to catch an out-of-the-way order that could be done by running another truck into his territory. Good dispatching is a combination of good judgment and experience in handling the work and a thorough knowledge of the ordermen and the territory that they cover and no specific method of dispatching can be easily described. As an illustration of what can be accomplished in dispatching it may be interesting to know that we have been able to reduce the mileage per order from nearly a mile to approximately one-half a mile. The saving in transportation costs by this reduction of mileage is evident.

Garage Operation and Equipment

A well-equipped and well-conducted garage is one of the essential features of a well-organized transportation system, and one that offers many opportunities to exercise good judgment.

As was stated previously our garage is combined with the works repair shop and storeroom, thereby saving a duplication of many machine tools, hand tools, and repairs essential to both departments as well as combining their storeroom facilities. Our work's room foreman is also in chargs of the garage and much of the credit for the present satisfactory operation of our garage is due to his good management. We have only two garage mechanics and they are able, not only to take care of all the cars and trucks but do a certain amount of outside repair work.

Normally the distribution shop work is such that five or six ordermen can handle it, leaving one or two trucks in the garage. We attempt to give each truck a thorough overhauling at least once a year, reboring the cylinders, and putting in oversize pistons and scrapping bearings when the condition warrants its. The day garage man devotes most of his time to these major repairs, and to repairing breakdowns that occur on the street.

Each truck man when turning in his truck at the end of the day reports its condition on a garage repair ticket, and the minor repairs called for on these tickets together with the filling and cleaning of the trucks constitute the principal work of the night man.

The garage repair car is a Ford with an express body. Its equipment is given in Table 4. This equipment has proved adequate to any ordinary breakdown. Two complete Ford rear assemblies are kept for repair purposes and facilitate quick repairs and saving of time. A testing block has recently been installed in the garage and all engines overhauled are run for a number of hours before putting them back in the machine. A vulcanizing bench is fitted up with all equipment necessary for both tube and casing repairs, but at present we are not attempting casing repairs. A rotary converter set for charging storage batteries has also recently been added to the garage equipment. A complete assortment of Ford repairs is carried in stock at all times. Like most owners of Ford cars we have at times been victims of the oratorical abilities of accessory salesmen, and have tried a number of devices to reduce gasoline and tire bills and sooner or later have discarded most of them as of little value. Many of the devices sold for Ford cars doubtlessly have merit if given proper attention by the driver of the car on which they are installed but it has been our experience that any device requiring any amount of adjustment or care by the driver is unsatisfactory as he will not bother with it.

Transportation Costs—Method of Keeping Operating Expenses and Transportation Reports

Two distinct systems of determining transportation costs are employed, one to determine the proper division of the cost of transportation over the different accounts, the other is to determine the operating cost of individual cars and trucks.

The method used to determine the distribution of transportation charges to the various accounts is as follows:

TABLE 4

Garage Emergency Car Equipment

1 complete front wheel	Schrader valve cores
1 complete rear wheel	Tire irons
1 Weaver auto ambulance	Jacks
1 tow bar, 2 tow chains	Spark plugs
1 emergency rear axle	Timer cases
1 shovel, 1 crowbar	Timer rollers
Spotlight and trouble light run by storage battery	Timer wires
	High-tension wires
Tire pump	Coil vibrators
2 30x3-in. tubes	Extra coil unit
2 30x3½-in. tubes	Wire to connect storage battery to ignition system
Blowout patches	
Tube patches	

The following repairs are carried only as needed:

Rear assembly complete	Casings

The number of hours that each truck is used is obtained from the time vouchers. This is done by using a certain symbol, as for example a red square or a blue circle to represent a certain variety of a truck and placing this symbol around the time as it appears on a man's time voucher indicating that he used a certain variety of truck for this time. The timekeeper in making up the time takes off the figures thus marked, giving the number of hours that the various varieties of trucks were used during the month.

The time that the cars used for executive work are run each month is estimated at a certain fixed monthly rate based on several years' experience.

The operating cost of each car or special truck as compared with the operating cost of an orderman's Ford truck has been obtained from the operating cost record of past years and this relative cost, which we call the Ford truck factor, is multiplied, for each car or truck by the number of hours that this car or truck was used during the month. In this way we obtain a total which represents the number of hours that an orderman's truck would have to run to be equal in operating cost to all the cars or trucks combined or in other words the operating time for the various cars is reduced to its equivalent in Ford truck hours.

The total transportation expense for the month is divided by the total Ford truck hours obtained as explained above and the value of a Ford truck hour, as we call it, thus obtained is multiplied by the number of Ford truck hours charged to each classification to obtain the transportation charges to the classification.

The above explanation is rather involved and possibly may be made clearer by an illustration. We will assume that the operating costs reports show that it costs one and one-half times as much per hour to operate the drip truck as it does to operate an orderman's Ford truck. The Ford truck factor for the drip truck would be one and one-half. If the drip truck were used 140 hours during the month 1½ x 140, or 210 Ford truck hours, would be charged to the drip pumping account, complaint expense. Assuming that the total monthly transportation cost was $1,500 and the total Ford truck hours were 3,000, the cost of a Ford truck hours would be 1500/3000=$0.50, which unit cost multiplied by the Ford truck hours charged to the drip truck would give the total transportation charges for the drip truck for the month, or $105.00.

The question that naturally arises is, why not use

TABLE 8

Method of Keeping Detailed Operating Costs of Vehicles

Car No. 106—

	January, 1919		February, 1919				March, 1919			
	Cost	Per Mile	Cost	Per Mile	To Date	Per Mile	Cost	Per Mile	To Date	Per Mile
Gasoline	$12.19	$.0230	$13.11	$.0287	$25.30	$.0257	$15.41	$.0326	$40.71	$.0279
Lubrication	1.62	.0031	1.42	.0031	3.05	.0031	1.16	.0025	4.21	.0029
Insurance	.44	.0008	.44	.0010	.88	.0009	.44	.0009	1.32	.0009
Tires	....	....	....	....	....	....	12.16	.0257	....	....
Repair, labor	9.19	.0173	12.77	.0280	21.96	.0223	10.17	.0215	34.12	.0234
Repair, sundries	14.82	.0280	7.73	.0170	22.56	.0229	30.58	.0647	32.73	.0224
Cleaning labor	2.50	.0047	2.00	.0044	4.50	.0046	2.50	.0053	35.08	.0240
Cleaning sundries	....	....	....	....	....	....	....	....	2.50	.0017
License	9.00	.0170	....	....	9.00	.0091	....	....	9.00	.0062
Equipment	....	....	....	....	....	....	....	....	....	....
Total	$49.78	$.0939	$37.47	$.0822	$87.25	$.0885	$72.42	$.1531	$159.67	$.1094
Miscellaneous	43.08	.0813	29.36	.0644	72.44	.0735	27.73	.0586	100.17	.0687
Depreciation	21.20	.0400	18.24	.0400	39.44	.0400	18.92	.0400	58.36	.0400
Total	$64.28	$.1213	$47.60	$.1044	$111.88	$.1135	$46.65	$.0986	$158.53	$.1087
Operating cost	114.06	.2152	$85.07	$.1866	$199.13	$.2020	119.07	.2517	318.20	.2181
Driving	45.76	.0863	$40.18	$.0881	$85.94	$.0872	54.11	.1144	140.05	.0966
Grand total	$159.82	$.3015	$125.25	$.2747	$285.07	$.2892	$173.18	$.3661	$458.25	$.3141
Miles	530		456		986		473		1,459	
Hours	105.80		93.60		199.40		125.40		324.80	
Gasoline	53		57		110		67		177	
Oper. cost per hour	$1.078		$.9089		$.9986		$.9495		$.9797	
Miles per gallon	10.00		8.000		8.964		7.060		8.243	

the actual operating costs of each machine and charge these costs over the accounts as they are benefited by the use of the machines instead of using the involved system explained above? The answer is that by using this system it is possible to obtain an approximately correct distribution of transportation charges without going to the expense and labor of keeping a detailed operating expense account for each individual machine. This statement, of course, presupposes that the relative cost of operation of the various trucks and an orderman's truck has been accurately determined and that the actual hours' use of the machines whose hours are estimated nearly agree with the estimated value.

The method that we employ for determining the detailed operating costs of the individual cars and trucks can best be explained by referring to Table 8 which is a copy of a page from the transportation book, the page shown being for the 1-ton delivery truck for the months of January, February and March of this year. The items included in the first total, viz.: Gasoline, lubrication, insurance, tires, repair labor, repair sundries, cleaning labor, cleaning sundries, license and equipment—give the actual operating expenses of the truck for the month exclusive of depreciation and overhead operating expenses. The depreciation is computed from the original cost, the mileage that we expect to get from the truck and the estimated selling value at the time we dispose of it. In the case of this particular truck depreciation is estimated at four cents per mile. Overhead operating expenses or, as the item appears on the report illustrated, "miscellaneous," includes all labor and material that cannot be applied directly to any one car or type of vehicle. This includes repairs, stock, gas, electricity, telephone, water, heat, etc., for the garage. It also includes a certain proportion of storeroom expense. These miscellaneous items totaled for the month are proportioned to the various vehicles on a predetermined percentage basis. The second total on the page, shown as "operating costs," is the first total operating cost plus depreciation and overhead accounts. To determine the hourly cost of operating the truck the total operating cost is divided by the number of hours that the truck was used, this last value being obtained from the truck driver's voucher. The remaining figures on the report are self-explanatory.

Table 9 illustrates our monthly transportation report. It is simply a summary of the following information for each of the vehicles, days used, miles run, gas and oil used, miles per gallon of gas. Showing the miles per gallon obtained by the various drivers it is more or less of a criterion of the driver's ability to run a car economically.

Table 10 illustrates a "daily report of ordermen." It shows almost at a glance the amount of work completed each day by each orderman's truck and also the miles per stop. This last figure shows how well the dispatcher is doing his work.

Until recently two other monthly transportation reports were kept. One of these was a detailed repair record for each vehicle describing the nature of all repairs and giving the labor and material used thereon for each vehicle. This report was discontinued because it was found possible to obtain practically the same information from the garage employees' time cards and the garage storeman's record of material issued. The other report was a combination of an orderman's work report and a transportation

TABLE 9
Monthly Transportation Report

Driver	Days Used	Miles Run	Gas Used	Oil, Qts.	Miles per Gal.
Hudson touring	28	490	52	0	9.4
Hudson roadster	28	360	46	2	7.8
Chevrolet	20	317	31	2—1 pt.	10.2
Ford touring	25	317	26	2	12.1
Ford sedan	28	443	36	5—1 pt.	12.3
Shop foreman	28	600	53	8—1 pt.	11.4
Ford extra	20	266	26	8	10.2
Ford Sp. (St. Dept.)	28	566	41	3	13.8
Drip truck	10	181	30	2	6.0
Collector No. 112	28	849	61	9	13.9
Special inspector	26	730	63	12	11.6
Total	193	3,952	336	49	11.2
Peerless truck	3	7	6	0	0
Kelly 1-ton	24	473	67	19	7.1
Ford No. 10	22	776	71	13	10.9
Ford No. 12	11	*244	30	6	8.1
Ford No. 14	25	*397	43	8	9.3
Ford No. 15	25	*526	58	10	9.1
Ford No. 16	25	*602	72	7	8.3
Ford No. 17	24	*447	64	12	7.0
Ford No. 18	25	394	38	9	10.4
Ford No. 19	24	531	60	8	8.9
Total	178	3,917	436	73	9.0
Motorcycles No. 1	0	0	0	0	0
Motorcycles No. 2	0	0	0	0	0
Total motorcycles	0	0	0	0	0
Total motors	474	9,516	868	146—1 pt.	9.7
Grant Witmer			35	4	
G. A. R.			1	0	
Rep. works			2	0	
P. De Vine			8	0	
Winters			10	1	
West Side office			1	0	
F. Goode			29	2	
Sherman			0	5	
Orris			0	5	
			1,054	199—1 pt.	

(Stock on hand, 181 gal.)

*Estimated mileage

DES MOINES GAS COMPANY — DAILY REPORT OF ORDERMEN — 4-24 — 1919

TRUCK NO.	DRIVER	SUNDRY SALES TO-DAY	SUNDRY SALES TO DATE	ORDERS HANDLED: SUNDRY SALES COMPLETED TO-DAY	SUNDRY SALES COMPLETED TO DATE	ALL OTHER COMPLETED TO-DAY	ALL OTHER COMPLETED TO DATE	C. G. I. TO-DAY	C. G. I. TO DATE	MILES PER STOP TO-DAY	MILES PER STOP TO DATE
	Pratt	X	400	1	2	30	567	13	208	60	64
	Duce	X	12 31	X	9	24	564	9	202	47	43
	Whitney	X	6 76	X	7	X	440	X	97	X	47
	Ward	X	18 04	X	14	24	600	12	192	44	41
	Mallinder	X	18 80	X	13	17	541	3	158	80	47
	Adams	X	X X	X	X	X	151	X	50	X	43
	Wilbur	X	X X	X	X	X	41	X	9	X	39
	Hart	24	X	1	1	29	194	8	46	46	46
		24	49	1	48	124	3042	41	991	23	48

FORM 185 — TABLE 10 — SIGNED J. Hudson — DISPATCH CLERK

THE HORSE, HOWEVER, STILL HAS HIS USES

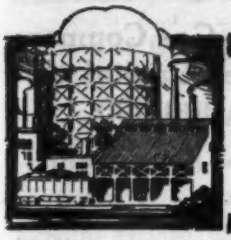
report and it showed the following items for each truck driver:

Number of trips made.
Number of stops made.
Number of jobs completed.
Number of C. G. I. stops.
C. G. I. stops per cent of completed orders.
Number of miles.
Gasoline used, gallons.
Miles per gallon of gasoline.
Miles per stop.
Rate per day.
Points per hour.
Cost per point.
Number of sundry sales orders taken.
Cash amount of sundry sales orders taken.

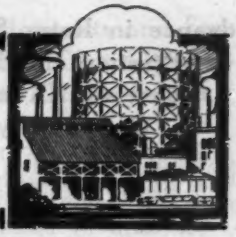
The completed report was a fairly accurate analysis of the comparative efficiency of the various truck drivers, but as most of the men employed for this work had been thus emuloyed for some time, their comparative efficiency was quite well known and the report was considered unnecessary and as it involved a good deal of clerical work it was discontinued.

Boston Company Installs Fifteen Emergency Motor Cars

For the greater protection of life and property, the Boston Consolidated Gas Company has recently installed 15 emergency motor trucks in different sections of the city. They are especially built and equipped to cope with any situation that may arise through leakage of gas, and each has a carefully picked and trained crew of three men. Each truck carries as a part of its equipment a pulmotor, for use in resuscitating persons overcome by gas or smoke: two gas masks, which enable the wearer to penetrate the densest gas or smoke, or even ammonia fumes, with comparative safety; every sort of emergency tool for work on gas pipes and mains, including a variety of wrenches, bars and hammers, two fire extinguishers, a ladder to be employed in descending into cellars and manholes, rescue ropes, rubber boots and coats and first-aid kit. The new emergency trucks have a distinctive finish, which will soon make them well known in the streets. They are painted a French gray and the arrangement of the body is such that all the materials and tools can be gotten at quickly and without confusion. The chassis are all of Dodge Brothers' make and some of the bodies weer built to order for the company.



NEWS OF THE GAS INDUSTRY



Gas Men Prominent in Boy Scout Campaign

At a recent luncheon held at the Bankers' Club in New York City preliminary to the opening of the drive of "Scout Week" to enlist adult associate members in the Boy Scouts, Frank W. Smith, vice-president of the United Electric Light & Power Company, pledged 100 per cent membership in the gas enterprises with which he is associated.

Nicholas F. Brady, representing the Consolidated Gas Company, vouched for the officers and members of that and several other companies, saying he was sure of at least 15,000 members. Louis D. Gawtry, who is also associated with the Consolidated, said he could assure the chairman of 25,000 members.

Standard Gas & Electric Company Resumes 8% Preferred Dividends

At the regular meeting of the directors of the Standard Gas & Electric Company held May 27 dividends on the preferred stock were increased 8 per cent per annum by the declaration of a dividend of 2 per cent for the last quarter, payable upon the preferred stock June 14 to shareholders of record May 31. The company announced that this is to be its future regular dividend policy. This dividend is paid from earnings of the company for the last quarter, entirely irrespective of the very large earnings of the Shaffer interests which accrue to the Standard Gas & Electric Company from Jan. 1 of this year. In view of the completion of the acquirement of the Shaffer properties and the further large increase to the Standard Gas & Electric Company's earnings, the president appointed a committee to report at an early date upon a plan for the liquidation of the unpaid accumulated dividends on Standard preferred stock amounting to approximately 13 per cent.

Iowa District Gas Association Held Its Fourteenth Annual Convention at Lincoln, Neb.

The fourteenth annual convention of the Iowa District Gas Association held its session at Lincoln, Neb. President Borden of Hastings, Neb., called the opening session of the Victory Convention to order on Wednesday, May 21, he was greeted by an enthusiastic group of gas men from Iowa, Nebraska and South Dakota, including a goodly number of associate members, representing manufacturers of appliances and gas apparatus.

The Wednesday morning session was devoted to reports of committees, elections and other routine business. Thirty-four new members were added during the year—the result of a quiet but nevertheless effective campaign directed by President Borden.

The following men, placed before the convention by the nominating committee, were unanimously elected to office: President, George D. Roper, president of Eclipse Stove Company, and vice-president of Boone Gas Company, Boone, Iowa; first vice-president, Wm. H. Taylor, manager, Omaha Gas Company, Omaha, Nebraska; second vice-president, C. N. Chubb, manager, Peoples Light Company, Davenport, Iowa; secretary-treasurer, H. R. Sterrett, engineer of distribution, Des Moines Gas Company, Des Moines, Iowa; members of council to succeed Messrs. Charles Smith, A. S. Graham, R. K. Runner and C. N. Chubb: F. J. Hanlon, president and general manager Peoples Gas & Electric Company, Mason City, Iowa; W. J. Bertke, assistant manager, Sioux City Gas & Electric Co., Sioux City, Iowa; A. L. English, manager, Citizens Gas & Electric Company, Council Bluffs, Iowa; Thos. Crawford, manager, Clinton Gas & Electric Company, Clinton, Iowa.

On account of the unavoidable absence of Jansen Haines, president of the Des Moines Gas Company, who had expected to represent the American Gas Association, E. H. Martin, of Des Moines, presented for action the question of affiliation with the national organization. Mr. Martin gave a brief history of the American Gas Association, outlining its structure and citing some of the advantages of individual and of company membership and finally stating the reasons why the I. D. G. A. should affiliate with the A. G. A. Needless to say there were no dissenting votes when the question was put before the convention.

With President-elect Roper in the chair, A. W. Borden delivered his presidential address which was enthusiastically received. Mr. Borden made some very pertinent suggestions on the subject of rates and on the so-called normal cost of operating a gas plant and took an optimistic view of the present situation.

W. J. Bertke's paper on "The Investment Condition as Faced by the Gas Industry in Connection with the Distribution System and the Development of New Territory," opened the Wednesday afternoon session and was the means of starting an excellent discussion of the subject—the general opinion being that there will be a wonderful building boom throughout this territory in the next few years with its subsequent demand for main and service extensions; that such extensions will probably cost twice as much as in pre-war times; that gas companies should make such extensions on a sound business basis; that now is the time to discontinue the giving away of those things which should be paid for by the consumer and in the case

(*Continued on page* 523.)

Advance in Rates Suggested as Practical Method to Conserve Natural Gas Supply

A sharp increase in the price of natural gas as the only practical method for conserving the supply was set forth by speakers at the fourteenth annual convention of the Natural Gas Association of America in Cleveland, Ohio, recently. Such action, it was asserted, would lower consumption, postpone failure of the supply and enable the companies to give better service.

Delegates were told by President Kay C. Krick of Columbus to hold forth to consumers the experiences of the gas company in Kansas City, where the consumption decreased from an average of 24,000 cu. ft. a meter in a month to 6,000 when the retail price was advanced from 25 cents to 80 cents a cu. ft. The price advance suggestion and the conservation talk followed the statement of Prof. John A. Bownocker of Columbus, state geologist, a speaker at the convention, who said the natural gas produced in Ohio is but 40 per cent of the amount consumed. He said the prospect of finding new producing areas is unfavorable, and predicted cities would be without natural gas in the not far distant future unless the supply is conserved. Clifton W. Sears of Wooster, asserted that Ohioans should profit from the experience of the Indiana consumer. He said three-fourths of the natural gas produced in that state was wasted and that the supply was exhausted in sixteen years, but it would have lasted sixty-four years had it been used carefully.

Old Gas Holder to Be Turned into New Public Bathhouse

The demand of the residents of the south end of Holyoke, Mass., for a new bathhouse has been heard and in compliance with the request of the board of Public Works and the chairman of the Playground Commission, City Engineer T. J. MacCarthy made an inspection of the big gas holder in South Bridge Street to determine the cost of converting it into a public bathhouse. The building was found to be sufficiently large, but there are so many other things to take into consideration that Engineer MacCarthy must be given some time to estimate the probable cost of the change.

The changes would include the installation of a new front entrance, partial filling in of the present tank, the installation of a heating and filtration system, dressing rooms, offices and toilets. The present tank is 90 feet deep, but by reducing the pool to the size of the tank at the high school, 60 by 20 feet, ample space would be provided. There is a small "L" at the rear of the building, wherein the heating plant could be installed. The project is looked upon with favor by the residents, but the cost is expected to mount higher than expected.

Public Service Commission Issues Order to Restore Quarter Meters

The Public Utilities Commission of Idaho has ordered the Boise Gas Light & Coke Company to reinstate all quarter prepay gas meters taken from consumers where the latter desired them and to install such slot meters for all consumers applying for them. The company is permitted to charge a rate of $2.20 per 1,000 feet for the meters, which is 20 cents higher than the rate allowed for flat meters.

Federal Gas Company Pays $97,094 to City of Columbus

City Attorney Scarlett, of Columbus, Ohio, received a check for $97,094 from H. A. Williams, attorney for the Federal Gas Company, as a payment of the city's claim against the Ohio Cities Gas Company, growing out of the suit against the Federal Company.

Approximately $600,000 will have been added to city funds when money due since July 1, 1916, is paid, according to Scarlett. So far $458,637 has either been paid to the city or is secured by liberty bonds.

Miami Gas Company Sets Up Calorimeter

Chemists of the Huff Laboratories have finished setting up the Calorimeter recently purchased by the Miami Gas Company. Difficulty was experienced in getting the apparatus properly adjusted as the machine was damaged in transit, which increased the length of time necessary to tune it up.

Lone Star Gas Company Increases Capital to $10,000,000

Will Construct 45-Mile Pipe Line to Serve 20,000 New Customers

The Lone Star Gas Company will issue $4,000,000 new stock, which will be offered to present stockholders at par, $100 a share, on the basis of four new shares for each six shares now owned. This will bring the authorized and outstanding capital up to $10,000,000. Proceeds from the sale of stock will be used to construct a main 18-in. pipe line about forty-five miles long, which will give the company a large gas reserve for present customers, and add about 20,000 new consumers.

Gas Company Straining to Increase Production

The Fairmont Gas Engine Company of Fairmont, Minn., is making every effort within its power to increase production, owing to an overflow of orders which has been steadily growing since the signing of the armistice. An official said that if they could be manufactured, 500 engines could be used at once to fill present orders.

Of late the output has been increasing and it is hoped within the next few months the factory will be able to catch up. C. S. White, a member of the company, stated that an average day's business amounts to over $3,000.

Chinese Buy Considerable Proportion of Valdosta Gas Company's Coke

J. H. Haggerty of the Valdosta Gas Company, Valdosta, Ga., in discussing the sale of coke, said that his company sold about 25 per cent. of their coke to Chinamen. They receive orders for all amounts up to five or more tons from Chinamen within a radius of 75 miles of Valdosta. All orders are shipped and billed in the regular way and in every case a prompt remittance is made. In some cases the company may request a remittance by money order, or draft on a bank in Valdosta, and in every case the Chinaman does just as he is told. In several years' dealing with these people they have never lost a cent or have had any trouble in getting a prompt remittance.

Motion of Consolidated Company Heard; Decision Reserved

Judge Julius M. Mayer heard arguments in the Federal District Court the other day on a motion of the Consolidated Gas Company of New York to exclude William P. Burr, corporation counsel, as solicitor for District Attorney Swann in an action brought by the company to restrain Attorney-General Newton, District Attorney Swann and Public Service Commissioner Lewis Nixon for the first district from enforcing the 80-cent gas law of 1906 as being at this time confiscatory and unconstitutional. John A. Garver, representing the company, recalled the fact that Mr. Burr had been denied his motion for the city to intervene. John P. O'Brien, assistant corporation counsel, spoke at length on Mr. Burr's successful efforts in the original litigation for 80-cent gas in New York City which was finally carried to the United States Supreme Court. Judge Mayer reserved decision and called for briefs to be submitted to him.

Massachusetts Commission Favors Continuance of War-time Gas Rates

Cost of Labor and Materials Not Expected to Drop Immediately

Worcester people will pay $1.15 per 1,000 cu. ft. for gas until March 1, 1920, according to a decree filed by the gas and electric light commission amending its recent decree reducing the price of gas to $1.10 July 1.

A hearing on the question of war-time gas prices and whether they should continue to be charged while prices of labor and materials remain as during the war was held at the State House at Boston, Mass., before the gas and electric light commission.

"It is now apparent that the labor and material cost will not drop immediately," the commission announced. "Therefore the commission will change the orders so that war-time prices shall prevail until such time as circumstances warrant a reduction."

The company is given also an extension of time to March 1 to set aside the sum of $20,000 from the income to add to the surplus to make good dividends not earned prior to April 1, 1917.

Public Service Commissioner of New York Not in Favor of Municipal Control of Gas Plant

The chief counsel for the Brooklyn Borough Gas Company has publicly stated that the company will "go to the wall" unless it is permitted to charge more than the statutory rate for gas. Public Service Commissioner Lewis Nixon said decisively when asked what his attitude would be in the event of the company making good its threat to suspend operation:

"I would not accept the plant of the Brooklyn Borough Gas Company as a gift. If the company cannot produce gas profitably at the 80-cent rate, there is no hope of the city being able to do so. Who would pay the loss? The taxpayers, of course. No, I am not in favor of the city assuming charge of a gas plant which, according to testimony submitted to this commission, is a losing venture."

In about two weeks the Appellate Division is to give a decision in the Brooklyn Borough gas rate case. The court will give an opinion as to whether or not the dollar rate fixed by the old law of 1906 is still a limitation upon the company's charges, and it will also be determined just what the public service commission's jurisdiction is in the case where the Supreme Court has found that the rate fixed by the legislature is invalid.

These points, according to Godfrey Goldmark, chief counsel to the commission, are of the greatest public importance because the question of the commission's power will arise in all of the actions brought by gas companies in Greater New York, including the Brooklyn Union.

Lindsay, Cal., to Have Gas System

The board of trustees of Lindsay, Cal., passed an ordinance calling for a special election to be held on June 24 for the purpose of submitting to the voters the proposition of incurring a bonded indebtedness in the amount of $85,000, with the maximum rate of interest thereon at 6 per cent per annum, payable semi-annually. The purpose of incurring this indebtedness is for the acquisition, construction and completion of a gas work system.

Banking Interests and Stockholders of Ohio Cities Inspect Company's Properties

A party of bankers and representatives of brokerage houses left recently for an inspection trip of the oil properties of the Ohio Cities Gas Company. C. M. Hinman, assistant to President Dawes, is in charge of the party, which will go to Columbus, where it will be joined by a number of stockholders and banking interests from Chicago. The trip includes an inspection of the company's oil properties in Ohio and West Virginia. In the latter field the Cabin Creek district wells, refineries, casing-head plants and salt plant will be visited. Among the New Yorkers on the trip were H. B. Hatcher, of the Guaranty Trust Company; F. J. Leary, vice-president of the Central Union Trust Company, and Harry Hall, vice-president of the Merchants National Bank.

Increased Rates Have Not Yielded Increased Profits

Figures submitted to the State gas and electric light commissioners by the Brockton (Mass.) Gas Light Company, in connection with the city's petition that the commission establish a fair price for gas here, show increased rates have not yielded increased profits. Gas is sold to local consumers at $1.45 per 1,000 cu. ft. net price where bills are paid within ten days, otherwise the gross price of $1.55 is collected. In January, 1919, the company estimated a profit of $13,252 under the advanced rates, based on average consumption of gas during corresponding months in previous years. The actual profit was $4,775.

The estimate of profit for February was $9,420; the actual profit $7,424.

For March the company estimated a profit of $5,654. Instead there was a deficit of $1,730.

Further, the company claims it is paying a dividend of only 4.6 per cent, whereas it should pay 6 per cent.

National Fuel Gas Company has issued its annual report for year ended Dec. 31, 1918, showing $3,945,-614 net earnings from operation, compared with $4,446,495 earned in 1917.

New Flow of Over 46,000,000 Ft. of Gas Daily in Six Weeks

The Clear Creek Oil & Gas Company, of Fort Smith, Okla., brought in a 9,000,000-ft. gasser in the New Williams Field of Crawford County. The hole is 2,195 ft. deep, with the tools 90 ft. in the sand. The test will be drilled about 15 ft. deeper. The first gas was found at 2,170 ft. This is the third big gasser this company has brought in in this field in six weeks. The combined open flow of these wells at the time they were brought in is 30,000,000 ft. Added to this are two wells, the one of the industrial oil and gas company, with a combined flow of 16,000,000 ft., making 46,000,000 ft. of gas brought above ground in the Williams Field in six weeks.

Laclede Company Will Show Coal Dealers Every Phase of By-Products Coke Manufacture

Approximately 500 retail coal dealers who are expected to attend the convention of the Missouri State Retail Coal Dealers' Association in St. Louis on June 23 and 24 will be taken through the by-products plants of the Laclede Gas Light Company on the second day of the convention. The party will be guests of the Warren Coke Company and the gas company, and will be shown every phase of the manufacture of Laclede Elkhorn by-products coke.

Atlanta Company Reports Remarkable Growth in Demand of Its Gas

The Atlanta Gas Light Company reports that for the week of May 24 the gas send-out from the works showed 21.8 increase over the corresponding week of 1918. This figure was only slightly under the highest figure shown by any other week's increase since January 1, which was 21.96 for the week ending April 20. Every department of the gas company receives the effect of this tremendous growth in Atlanta's demand for fas, but the sales department is one of the first to perceive it, in the distribution of appliances for the use of gas for the thousand and one purposes to which it is adapted.

Indiana Special Committee Establishes 570 B.t.u. Monthly Standard

After five months of scientific study of Indiana gas plants the gas heat unit committee established 570 B.t.u. as the minimum monthly standard for the State, the daily minimum at 540 B.t.u. The rules adopted by the committee provide for a penalty against one gas company that falls below the monthly standard by rebating a certain amount from the bills of consumers. The heat standard for gas in Indiana at present is 600 B.t.u., with a minimum of 550 B.t.u. According to the standard set by the committee, the gas companies will be required to maintain a standard that will not vary more than 60 B.t.u. According to the tentative rules adopted by the committee, a penalty will be applied to gas companies that fail to meet the established standard. The gas company that produces gas richer than 600 B.t.u. will be penalized by not being permitted to add to its monthly average the amount over 600 that may be produced. The new standard will not apply to the Citizens Gas Company of Indianapolis, which is required by a city franchise to maintain a heat standard of 600 B.t.u. The Indianapolis company, however, has a petition pending before the commission asking that the State body take over the jurisdiction in this matter. The standard adopted is of great importance, as nine other States have been watching the investigation in Indiana and will abide by the result of the research work. The total expense of the investigation was about $12,000, most of which was borne by the bureau of standards.

Ottawa, Ill., Service Plant in Full Operation with Additional Storage Capacity

A gas generator set removed from the Evanston Public Service plant to Ottawa, Ill., is now in full operation, together with a large station meter. The new holder and the plant's old one now give a total storage capacity of 400,000 cu. ft. The increase in the generating equipment and the enlarged storage room now makes it possible for the plant to make the required gas in the day-time. The plant is one of the largest public service plants outside of Cook County.

Utilities in Chicago District Placing Their Returned Soldiers Immediately on Pay-Roll

Jobs Found Afterward

"Put men back on the pay-roll, then find them jobs" is the slogan of all the public utilities in the Chicago district. Not only is it the slogan, but it is actually the plan being carried out unanimously by the great utilities. The phrase came long after the fact.

The Peoples Gas Company and the Illinois Gas Association are leaders in the movement. At a recent meeting of the latter association for discussion of reconstruction problems, Samuel A. Insull was the dominating spirit. "See that the returning men get jobs. Put them on the pay-roll first and get them jobs later," he urged.

The policy of the utilities was made known only by the issuance of a public resolution by the Public Service Company of Northern Illinois, which ordered all employees put on the pay-roll as they came out of the army and navy. These men will get their regular two weeks' vacation with pay. They can take their vacations before they return to work or later.

A check up showed that this plan is being carried out by all the other public utility corporations in the territory. A total of 18,750 employees were on pay-rolls of public service corporations in this district at the time war was declared. Of these, 3,330 went to war. All will get back their jobs, or better ones.

The men are distributed among the corporations as folows:

	Employees	Went to War
Peoples Gas	5,531	637
Commonwealth Edison	5,531	1,374
Elevated Railways	4,225	656
Public Service Company	1,855	340
Illinois Northern Utilities	1,318	357
Cen. Ill. Pub. Serv. Co.	828	129
North Shore Electric Line	1,281	133

The North Shore Gas Company of Illinois, which serves Waukegan and neighboring towns, has applied to the public utilities commission for permission to increase rates for its service.

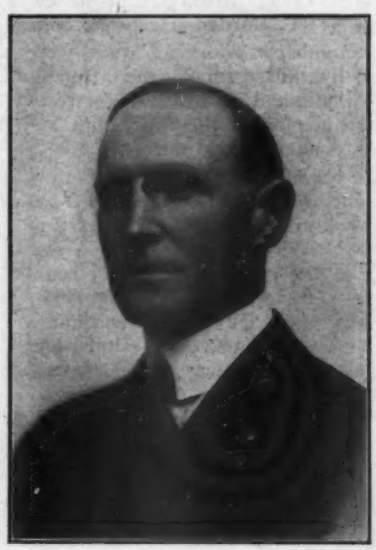
Iowa District Gas Association Held Its Fourteenth Annual Convention at Lincoln, Neb.

(Continued from page 519.)

of main extensions for the development of new tracts the real estate operators should make the investment; that in the making of franchises the length of pipe to be installed gratis for each consumer should be omitted if possible since many gas companies are now compelled by franchise to install mains even though their receipts are such that no return is made on the investment; that the growth of the industry depends on extensions and that efforts should be made to secure rates that will permit the supplying of gas to the rapidly growing sections of our middle-western cities and towns even though the investment necessary is much higher than before the war. One man stated that in his situation he collected the cost of the extension for each consumer from that consumer and then made the refund of the cost or part of it, as the case might be, by cancelling the consumer's gas bills. In this way he did not start refunding until gas was actually consumed and then in proportion to the amount used. Various other methods of refunding the investment to the consumer or to the real estate man we aer osltouched upon.

"Charging Consumers for Complaint and Trouble Service," a paper by C. A. Nash, new business manager at Davenport, Iowa, was next read and the discussion occupied the remainder of the session. The discussion was very general, a large number of men taking part, and brought out the fact that where a charge had been installed for complaint and repair work which had previously been done gratis, very little opposition had been experienced provided the work had been well done; that the number of complaint orders and the operating cost of the distribution department had been materially reduced. On the point of the discontinuance of free lamp maintenance it was thought that the sales of lamps and accessories indicated that the lighting load was not being lost due to consumers allowing the lamps to get out of adjustment and then discontinuing their use.

An informal banquet was held at the Lincoln Hotel, starting at 6.30 p. m. on Wednesday evening. J. E. Shuff, new business manager of the Lincoln Gas & Electric Company, arranged the entertainment features and that he more than made good was shown by the applause which greeted the various numbers put on by his female entertainers who sang and danced around (not on) the tables "a la cabaret." Colonel Roper said "he wasn't nearly as old as he looked," and strange to say Tom Grant instead of being fussed when the little lady sang "Zose Naughty Eyes" at him, really succeeded in getting her number. The Davenport contingent led in some



CHESTER N. CHUBB
Manager Peoples Light Company, Davenport, Iowa, elected second vice-president

songs of which "The Long, Long Trail," proved to be the favorite. At the conclusion of the dinner and lighter entertainment features, E. H. Martin acted as toastmaster and several speeches followed. G. W. Clabaugh of Omaha, told of what the I. D. G. A. had meant to him, one of its founders and spoke in touching tones of the men who had been part of the Association in the past but who had gone on to other fields. In the memory of these men the diners rose to their feet. Charles Smith of Yankton, South Dakota, who recently returned from the Government service where he installed the water supply, sewers, etc., at Camp Knox, Virginia, spoke in his droll and affectionate manner of how he valued the friendship formed in the I. D. G. Association and how he appreciated the warm welcome that had been extended to him after his two years' absence. President Newens of the Nebraska School of Music and Oratory, after telling some very humorous stories in his inimitable manner, showed how our success or failure directly or indirectly affects many others and how associations such as this are of great benefit to the communities. Colonel Roper, the newly elected president, spoke briefly, as did A. W. Borden, the retiring president.

On Thursday morning C. J. Hauschildt's paper on "Retort House Coke as Produced in Small Coal Gas Plants for Domestic Use," and Mr. Stillson's paper on "Generator Fuel," were read, and then jointly discussed. W. M. Warren of St. Louis, gave a very instructive talk on coke, outlining the history of the industry in this country, the types and methods of operating coke ovens, etc. Mr. Hauschildt emphasized the proper quenching (not drenching) of coke and suggested that in a small plant instead of playing a hose on the coke the quencher should be made to carry the water in buckets, the thought being that in the latter case no more water than necessary would be used. In discussing generator fuel, the subject of controlling heats on the superheater of a small machine by means of a pyrometer was brought up by Mr. Kidder of Red Oak, who had trouble due to the fact that the pyrometer would be much beyond the proper temperature for gas making before his blowing period was ended and that he had discontinued the use of his pyrometer on this account. Mr. Chubb and Mr. Smith told of the many benefits derived from the various recording devices including pyrometers and the latter then explained that he had overcome trouble similar to Mr. Kidder's by installing the pyrometer elements in such a position that they were not in the direct path of the heated gases and then had calibrated his pyrometer for the point of most efficient gas making.

"Water Gas Tar Recovery," by H. C. Adams of Des Moines, was read and brought out a discussion on the handling of tar, its commercial value, various methods of computing the amount of tar made, etc.

Mr. Singer's paper on "Distribution Pressures," proved very interesting, as did the discussion of it. Mr. Byerly described the distribution system in use at Lincoln, which like the one spoken of by Mr. Singer, consisted of a combination of inter-

mediate and low pressure mains with district reducing governors. Mr. Sterrett in speaking of the latter system touched on the advantage of economy as compared to erecting outlying holders or laying large mains, stating that the Works holder pressure could be used in many cases except over the peak loads and that it had been found practicable to use intermediate pressures in main laid with cement joints. He suggested that even though not necessary at this time the wise gas man will adopt a system for the future development of his situation and if a system of intermediate pressure mains to outlying district governors is decided upon—an effort should be made to design the distribution lay-out in such a way that it will not be a difficult matter to isolate the intermediate pressure from the low pressure mains. In making a pressure survey, the time of peak load should be used and either carefully calibrated gauges or men with watches set together taking frequent readings, say every three minutes utilized.

The Thursday afternoon session was opened with an address by ex-Senator C. G. Saunders of Council Bluffs, Iowa, who spoke on "Some Thoughts on the Labor Question from an Outsider." Mr. Saunders, who has had large experience in labor troubles, settlement work, etc., held his audience's intent attention. He spoke of Bolshevism, its causes and results, of labor unions and their developments and how in his opinion education of our employees to want better homes, better living conditions and to feel that they are part of the institution and not mere machines paid to grind out so much work, would solve the problem in this country. He advised that we take an interest in the personal welfare of our employees and their families. His speech was full of homely illustrations and when he finished the applause was spontaneous.

Thos. Crawford's paper on "Collections," and R. E. Phillips' paper on "Reading Meters and Billing," were read and then jointly and very generally discussed. Various methods of billing and making collections were described and this part of the program proved to be very interesting, particularly to the commercial department men.

"The Transportation System of the Des Moines Gas Company," a paper by D. P. Allen, engineer's assistant at Des Moines, was read and proved to have many points of interest to the men who are confronted with the transportation problem.

Mr. Smith, reporting for the committee appointed by President Borden, announced the following men to serve as the I. D. G. A. representatives on the managing committees of the American Gas Association as per the affiliation agreement:

New business section, H. B. Maynard, Waterloo, Iowa; technical section, C. N. Chubb, Davenport, Iowa; manufacturers' section, W. M. Warren, St. Louis, Mo.; commercial section, A. W. Borden, Hastings, Neb.

A number of communications were read by the secretary and after E. H. Martin had reported for the resolution committee the fourteenth annual convention adjourned.

In commenting on the convention, outside of the fact that one of the gas men who is rather deaf registered in a physicians' convention also in session at the Lincoln Hotel and hearing something about gastritis thought he was in the right place even though he didn't recognize any friends, one might say that it was a decided success, the program was well arranged and the discussion was taken part in by a large number, was keen, did not drag at any time and was directly helpful to many of the men present.

Gas Oil Company of Chicago Files Petition in Bankruptcy

An involuntary petition in bankruptcy was filed May 31 by Thomas Murray as trustee of the Gas-Oil Company of Chicago against the Gas Oil Chemical Company, making a claim of $42,000. The petition charges an act of bankruptcy was committed by the defendant when it paid a judgment to the Tri-State Electric Service Company, obtained by court proceedings in Lake County, Indiana.

THE AMERICAN GAS & ELECTRIC COMPANY called a special meeting of stockholders on June 9 to vote on increasing the authorized capital stock of the company from $15,000,000, divided into 150,000 shares of preferred and 150,000 shares of common, par value $50, to $50,000,000, consisting of 500,000 shares of preferred and 500,000 shares of common, par value $50.

"War-Time" Gas Rates of Ten Companies to Continue

Ten gas companies in different parts of Massachusetts have been permitted to continue to charge war-time prices, according to a ruling of the Board of Gas and Electric Light Commissioners. The board had granted permission to increase prices during the war. It now finds that prices of raw materials warrant the continuation of present prices, but says the companies are expected to make voluntary reductions as soon as conditions improve. The companies receiving this permission and their present prices are: Arlington Gas Light, $1.25; Attleboro Gas Light, $1.30; Haverhill Gas Light, 90 cents; Lawrence Gas, $1.15; Marlboro-Hudson Gas. $1.55; New Bedford Gas & Electric Light, $1.10; Newburyport Gas & Electric, $1.80; North Adams Gas Light, $1.25; Northampton Gas Light, $1.25; Salem Gas Light, $1.25.

Friction from Escaping Gas Causede Fir in Huge Gas Well

Starting with a terrific roar and sending a tower of flames more than 150 ft. above the ground, gas well No. 15 on the Standard Oil Company's lease in the Elk Hills fields caught fire at 8 o'clock in the evening recently and up until a late hour burned strongly. The flames from the shaft were visible for many miles and the roar of the gas could be heard a distance of ten miles. Officials of the company stated that friction from the escaping gas caused the well to break into flames. When the fire broke out workmen had practically completed capping the well. The well is 1,900 ft. deep and the daily production of gas is rated at 30,000,000 cu. ft. Scores of workmen from various Standard leases on the West Side were immediately rushed to the Elks Hills fields and efforts were made to place a steel cap over the shaft. Owing to the terrific heat it was almost impossible for the workmen to arrange their capping line. Danger of the flames spreading to other wells on the leases was eliminated when men were placed at work guarding the various shafts in the Elk territory.

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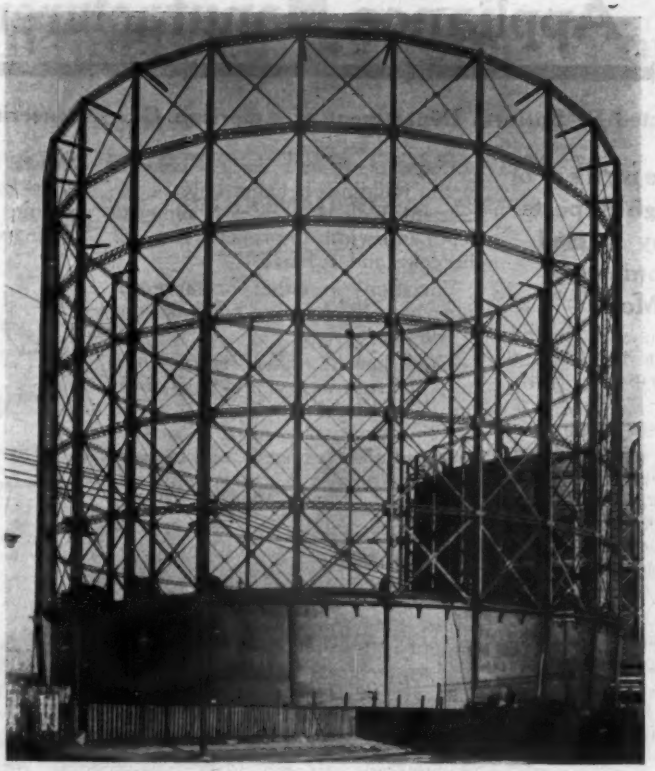

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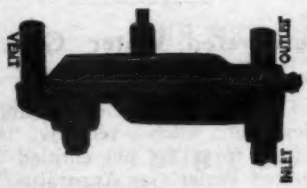

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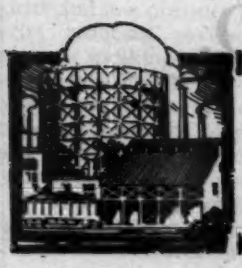
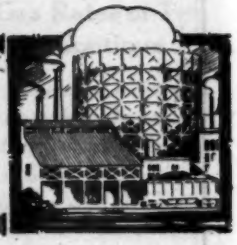


With The Equipment & Appliance Manufacturers



Conducted by Business Department of American Gas Engineering Journal

Description of Benches of Sixes with Through Reports Manufactured by Russell Engineering Company, St. Louis, Mo.

This type of bench is suitable for gas companies having a daily output of from 200,000 to 600,000 cu. ft. of gas.

Existing retort houses containing stopped-end sixes may be remodeled to accommodate through sixes, as the center to center of arch walls and over-all depth of benches need not be changed. In some cases the old arches and walls can be utilized and only minor alterations need be made to the retort house.

This type of carbonizing bench can be built according to either of two somewhat varying designs.

Design No. 1 has the basement floor at ground level and the operating floor 10 ft. more or less above ground. This design is preferable for a new plant, as the ventilation in the retort house will be better, the recuperator flues will be more accessible and it is possible to preheat the primary air.

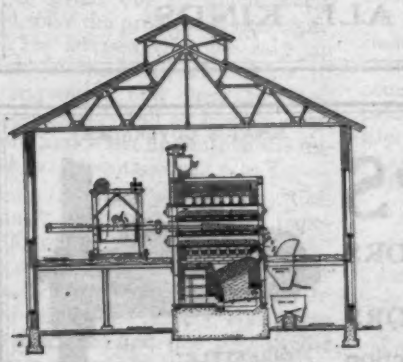


FIG. 1

Design No. 2 has operating floor at the ground level and the coke pit on discharge side below ground. This design accommodates itself readily to existing retort houses and will not necessitate radical changes in the building, it being only necessary to have the pit of sufficient depth and width to properly care for the coke and furnaces.

Variations in either of these designs may be made or combinations of the two designs.

These benches have retorts 16 x 26 in. in cross-section and 11 ft. 6 in. long (or longer if desired). The retorts are constructed of silica sections and fire-clay heads, and the setting tile are also of silica material.

Charges of 600 to 800 lb. of coal can be charged in each retort and burned off in six to eight hours' time.

The producer is what is known as three-quarter depth, and is contained within the bench proper. It has straight sides, ample capacity and large grate surface, having 1.4 sq. ft. grate area to each ton of coal carbonized.

The recuperators for heating the secondary air are also three-quarter depth and have a total heating surface of 228 sq. ft., or 31.8 sq. ft. per ton of coal carbonized.

In design No. 1 recuperation for primary air is also provided. In either design steam may be superheated in the recuperator flues, mixed with the primary air and the mixture introduced under the grates, reducing the clinkers to a minimum and resulting in a saving of fuel and less trouble in care of furnace.

The furnace castings and bench mountings are of heavy construction throughout, insuring durability.

Design No. 1 calls for a platform elevator to raise the coal from the ground level to the operating floor, the coal being taken up in standard coal-charging lorries of about 1,200 to 1,600 lb. capacity and charged into the retorts by hand.

Where design No. 2 is adopted, the elevator for coal can be dispensed with. In this case, however, other means must be provided for taking care of the coke.

In both designs a manual coke pusher will be used to discharge the retorts. This machine can be arranged to run on rails set in the operating floor or on rails supported from overhead beams.

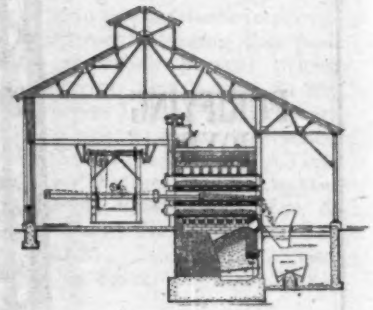


FIG. 2

The hot coke may be discharged either into coke-quenching chutes and from the chutes at a convenient time into coke cars which will run on track at basement or pit floor level, or directly into coke cars and quenched in the cars, this alternative depending on the head room on discharging side and on the number of benches being operated.

In design No. 1 the coke can be taken directly into yard at ground level or taken up on the platform elevator to a coke trestle and put into yard storage by gravity.

In design No. 2 an elevator or other means of elevating will be needed for coke exclusively.

Carbureted Water Gas Apparatus

The Gas Machinery Company, Cleveland, Ohio, recently issued bulletin form No. 490, entitled "Carbureted Water Gas Apparatus."

This bulletin consists of thirty pages, and gives a very concise and complete description of carbureted water gas apparatus, generators, fixing chambers, hydraulic seal, scrubbing and condensing machinery, blast apparatus and oil-feed systems, together with explanatory illustrations.

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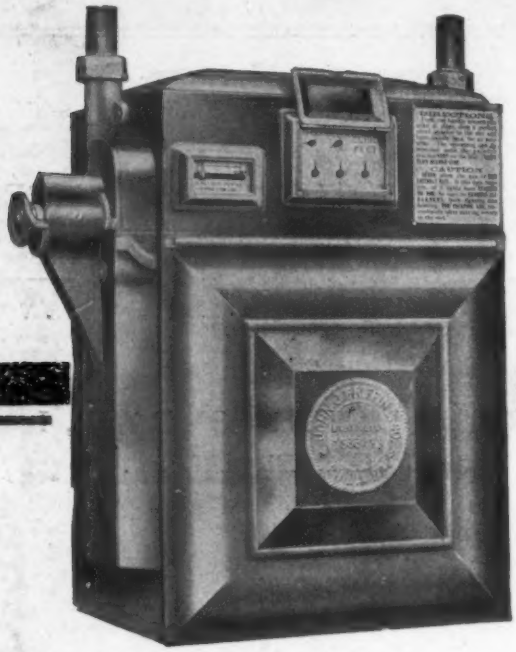

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